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Food Technology Abstracts

Central Food Technological Research Institute, Mysore.

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Department of Scientific and Industrial Research, New Delhi.

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FOOD TECHNOLOGY ABSTRACTS

Vol.26 No.4
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ABBREVIATIONS

A	ampere
AAS	atomic absorption Spectrometry
abstr.	abstract
ad lib.	ad libitum
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm^2, cm^3]
cal	calorie
cd	candela
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetra acetic acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10^{-15}, as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram
GC	gas chromatography
gn	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short time
Hz	hertz [frequency cycle/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcal, kg]
K	Kelvin
l	litre
lb	pound
lb	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
m	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt	.molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10^{-9}, as in nm]
N	Newton [kg m/s^2]
N.	North, Northern, normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10^{-12}, as in pCi]
P	poise
p	probability
Pa	Pascal [N/m^2]
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	south, Southern, etc.
s.d.	standard deviation
SDS	sodium dedecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp.,spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
w	watt
W.	West,Western,etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
µ	micro-[as in g, m]
%:	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

Chemical symbols are used for all elements.

ABBREVIATIONS FOR LANGUAGES

Language of text

Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
spanish	Es
swedish	Sv

GENERAL

752

Fenwick (GR), Lutomski (J) and Nieman (C). **Liquorice, *Glycyrrhiza glabra* L.Composition, uses and analysis.** *Food Chemistry* 38(2): 1990: 119-143

The liquorice plant (*Glycyrrhiza glabra* L., formerly *Liquiritae officinalis* Moench) has been used by physicians and herbalists since the earliest of times. Many of the early claims for the effectiveness of liquorice extracts, decoctions and potions have been shown by modern science to be credible, a root component (glycyrrhizin) being generally regarded as the major biologically active principle. Liquorice extracts (in pharmacy called succus liquiritae) are currently used mainly in the tobacco, pharamceutical and confectionary industries; because such extracts contain glycyrrhizin. There is a need for accurate methods for its estimation, in both crude isolates and finished products. The purpose of this review is to briefly describe the background to current interests in liquorice, to indicate the origins and usage of liquorice extracts and to discuss the comp. of liquorice, with particular emphasis on glycyrrhizin. Current methods for the analysis of glycyrrhizin will be considered and the levels found in liquorice roots, extracts and a range of products indicated. Brief mention will also be made of human exposure levels and the possible risk to human health as a result of consuming liquorice-based products. AS

753

Pathak (M) and Goswami (PC). **A study on food consumption pattern in rural areas of Assam (a case study in Jorhat district).** *Indian Journal of Nutrition and Dietetics* 26(11): 1989: 335-340

The food consumption and expenditure on food was studied during 1983-84 in 156 Assamese households selected from 9 villages of Jorhat district. About 59% of the household had an annual income Rs. 18,005 and the average size of the operational holdings was 1.32 ha. 67% of the total expenditure was on food; expenditure on cereals and cereal substitutes was 48% of the total food expenditure. Consumption of cereals was 48 g which was higher than the recommended level whereas the consumption of pulses, milk and milk products were much below the requirement. All farm size groups consumed below the min. target of 23% calories i.e. only 2074 calories. Calorie intake increased with increase in income. GSR

754

Joshi (C) and Joshi (VK). **Food processing waste management technology need for an integrated apporach.** *Indian Food Packer* 44(5): 1990: 56-67

Food industries produce large amount of various types of wastes causing environmental pollution. In this review, various methods to utilize waste and recovery of byproducts, by applying innovative measures and processed for waste reduction from food industries are described. Emphasis has been placed to adopt new technologies aiming at reduction of pollution by process modifications, inplant-control of pollution, and adaptation of novel treatment processes. Need for integrated approach to maximise resource utilization, energy saving methods and technologies, cost reduction and environmental control are described. 52 references. VKR

FOOD PROCESSING

Nil

FOOD PACKAGING

755

Ahvenainen (R), Skytta (E) and Kivikataja (R-L). **The influence of modified atmosphere packaging on the quality of selected ready-to-eat foods.** *Lebensmittel-Wissenschaft und - Technologie* 23(2): 1990: 139-148

The microbiological and sensory shelf-life of miscellaneous ready-to-eat foods: ham pizza, mayonnaise-based potato salad and vegetable salad with herring, were studied in modified atm. packages and compared with those of air-packed products. The main benefit product the gas packaging of pizzas was retarding the growth of mould and the discolouration of pizzas. However, N alone could not prevent the development of mould; at least 20% (v/v) carbon dioxide was needed. To some extent, gas packaging also delayed the microbiological and sensory changes in vegetable salad with herring. From the microbiological point of view, the retarding of the growth of yeast was the most significant factor, particularly in a atm. containing carbon dioxide. With regard to sensory quality, modified atm. packaging improved the retention of taste, especially that of herring. However, modified atm. packaging increased the sensory shelf-life of salad by only a few days. The shelf-life of mayonnaise-based potato salad could not be improved by gas packaging. On the contrary, carbon dioxide in high concn. (greater than or equal to 20%) caused a strong, objectionable off-odour and off-taste in potato salad. AS

756
Mahadeviah (M), Gowramma (RV) and Naresh (R). **Studies on the suitability of tinplate with reduced tin coating for packing fruit and vegetable products.** *Indian Food Packer* 44(6): 1990: 25-34

Cans with tin coating of E 2.8/2.8 g/m ^{2} (E 25-Japanese); E 5.6/5.6 g/m ^{2} (E 50-Japanese and indigenous) and E 11.2/11.2 g/m ^{2} (E 100-Japanese) were used for packing vegetables (potato, carrot, green beans and cabbage). Cans with tin coating of E 5.6/5.6 g/m ^{2} (OTS quality) with interior lacquer coating were used for packing mango pulp and juice. Canned products were stored at ambient temp. (25 - 20 C) and 37 C and studied for external appearence of the cans, loss of vaccuum, detinned spots/patches on the interior surface of the cans and sulphur staining, organoleptic quality dissolution of tin in plain and iron lacquered cans. The plain E-25 and E-50 tinplate cans were found not suitable for canning vegetables beyond three months. Lacquered E-50 tinplate cans (OTS quality) were suitable for mango juice and pulp packing and storing up to six months. VKR

757
Zanjal (PN), Rao (KVSS) and Mathur (BN). **Development in food packaging.** *Indian Dairyman* 42(10): 1990: 419-424

Review covers the existing food packaging system and projects the future demands. Aspects like consumer demands like packages, role of various types of plastics in packaging including flexible packaging and laminates, integrated packing including retort pouch, stand-up pouch, tetra pack cartons, tetra brick cartons, tetra rex cartons and tetra king cartons have been delineated. 19 references. SRA

Packaging materials

758
Addington (PW). **Environmental aspects - glass, cartons and plastic as containers.** *Journal of the Society of Dairy Technology* 42(3): 1989: 62-64

FOOD ENGINEERING AND EQUIPMENT

759
Kachru (RP) and Sahay (KN). **Low-cost hand-operated cleaner for food grains.** *Indian Farming* 39(12): 1990: 20-21

A low-cost, light wt. metallic double screen grain cleaner has been developed. The cleaner which can be used for all cereals and pulses can be easily fabricated by village artisans with local materials. The same cost of the cleaner and sac holder found to be Rs. 580/- (including a set of extra 3 sieves) and Rs. 170 resp. The cleaner can be used for all kinds of cereals and pulses. The capacity achieved as 150 kg/h for wheat, 2 - 5 kg/h for soybean, and 200 kg/h for Bengal gram. The purity of clean grain was achieved as high as 90.0, 90.8, and 99.6% and screen effectiveness as 75.4, 86.3 and 84.4% for wheat, soybean and Bengal gram resp. The cost of operation was found to be as low as Rs. 1.50/q at 100% sale for wheat. BV

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

760
Schwartz (StT) and Lorenzo (TV). **Chlorophylls in foods.** *CRC Critical Reviews in Food Science and Nutrition* 29(1): 1990: 1-17

This article reviews the current knowledge and understanding of the role of chlorophylls and their derivatives in foods. Covers chlorophyll structure, nomenclature, presence and distribution of chlorphylls in higher plants, extraction techniques, physicochemical properties for analysis (ultra-violet (UV) visible absorption spectra, fluorescence spectra, other spectroscopic properties and reflectance spectrophotometry), chromatographic methods of analysis (thin-layer chromatography and high performance liquid chromatography), decomposition of chlorophylls during senscence and storage, alterations of chlorophylls during food processing, kinetics of chlorophyll degradation, presence of chlorophylls and pheophytins in vegetable oils and new and future developments. 199 references. SRA

Chemistry(Analytical)

761
Gagnon (MJ) and Marcoux (AM). **A comparative study of three procedures for the isolation of volatile flavour compounds from a model solution.** *Acta Alimentaria* 128(3): 1989: 283-287

Three methods to isolate a mixtures of volatile flavour compounds from an aqueous model solution were tested: vacuum distillation, steam distillation and distillation-extraction. At p.p.m. and p.p.b levels, the best recovery and reproducibility were obtained with the distillation-extraction method. A comparison between three concn. methods has demonstrated that the nitrogen evaporation gave the best recovery value with a reproducibility similar to that of the rotovapour. When routine works were involved, the distillation-extraction method seems to be a good compromise to isolate volatile from aqueous products. AS

762

Stenram (U), Acevcedo (F) and Larsson-Raznikiweicz. (M). **Agarose gel isoelectric focusing of gliadins in the presence of ethanol.** *Food Chemistry* 36(4): 1990: 305-312

Conditions for the analysis of gliadins by isoelectric focusing in the presence of ethanol were worked out. Comparison of the electrophoretic band patterns obtained in aqueous and ethanolic media showed that the resolution was highly improved in the presence of ethanol. The gliadins were identified by immunological detection in nitorcellulose blots obtained from the agarose gels. AS

FOOD MICROBIOLOGY AND HYGIENE

Fermentation

763

Bopaiah (BM). **Microbiological and biochemical changes during the cocao beans fermentation.** *Indian Journal of Microbiology* 30(2): 1990: 217-219

During the fermentation of cocao pulp the temp. increased to 48 C on 5th day and the pH was 5.3 on the 6th day after the start of fermentation. Yeasts and bacteria dominated upto the 2nd day of fermentation and thereafter decreased. The yeast isolates belong to the genera of *Torulopsis* sp. *Saccharomyces* sp., *Rodotorula* sp. and *Schizosaccharomyces* sp. The bacteria were *Bacillus cereus*, *B. subtilis*, *B. licheniformis* and *Bacillus* sp. Total phenols and orthodehydroxy phenol in the cotyledons during the fermentation did not reveal any variation. Breakdown of anthocyanin pigment occurred during the fermentation. KAR

Fermented foods

764

Soni (SK) and Sandhu (DK). **Indian fermented foods.Microbiological and biochemical aspects.** *Indian Journal of Microbiology* 30(2): 1990: 135-157

Aspects covered in the review include microbiology of fermentation: biochemistry of fermentations; and description about some of the common Indian fermented foods like Punjabi *warri*, *papadam*, *bhallae*, *vadai*, *idli* and *dosa*. Tabulated information is provided on prevalance of organisms in fermented food in different seasons, and microbiological, biochemical and nutritional constituents in fermented foods at the beginning as well as at the end of fermentation. 61 references. KAR

Microorganisms

765

Palanippan (S), Sastry (SK) and Richter (ER). **Effects of electricity on microorganisms:.A review.** *Journal of Food Processing Preservation* 14(5): 1990: 393-414

This review discusses a number of different methods of electrical treatments and their non-thermal effects on microorganisms. Subject discussed include electric pasteurization of milk, electrohydraulic shock, electroporation, and electroconductive heating. Information relating to mechanisms contributing to microbial death is summerised and discussed. BV

Bacteria

766

Harris (PL), Cuppett (SL) and Bullerman (LB). **A technique for comparison of isolation of lipolytic bacteria.** *Journal of Food Protection* 53(2): 1990: 176-177

Three different agar diffusion screening methods, employing two growth media, standard plate count agar (SPCA) and 1% peptone enriched trypticase soy agar (TSA), were used to isolate psychrotrophic bacteria from raw milk which produce lipase. Clarified butterfat and nile blue sulphate served as the substrate and dye, resp., in all methods. Although a double-overlay method yielded slightly greater numbers of lipolytic bacteria than a single-layered method with comparable media, better visual clarity was achieved with the single-layered method. Peptone enriched TSA medium supported better growth of lipolytic bacteria than SPCA. AS

Escherichia coli

767

Matner (RR), Fox (TL), Mciver (DE) and Curiale (MS). **Efficacy of Petrifilm ™/ *E. coli* count plates for *E. coli* and coliform enumeration.** *Journal of Food Protection* 53(2): 1990: 145-150

The Petrifilm *E. coli* count plate (PEC) method was compared to the AOAC MPN method to determine the efficacy of the PEC method to detect *E. coli* and coliforms in 115 inoculated cheese samples, 94 vegetable samples, and in 100 naturally contaminated poultry samples. The PEC method was compared to two other coliform plate count methods. The 24 h PEC method is as good as or better than the AOAC MPN method for the detection of *E. coli*. In addition, qualitative results suggest that the PEC method may be more sensitive than the 9 tube MPN method for the detection of very low numbers of *E. coli*. Comparable coliform results were obtained. AS

Lactobacillus

768

Hosono (A), Wardojo (R) and Otani (H). **Binding of amino acid pyrolyzates by lactic acid bacteria isolated from 'Dadih'.** *Lebensmittel-Wissenschaft und - Technologie* 23(2): 1990: 149-153

All the latic acid bacterial strains isolated from *'Dadih* were bound effectively to 3-amino-1,4-dimethyl-5H-pyrido [4,3-b] indole (Trp-P1) and 3,-amino-1-methyl-5H-pyrido [4,3-b]indole (Trp-P2), and moderately to 2-amino-6-methyldipyrido (1,2-1:3',2'-d] imidazole (Glu-P1). Among the strains tested *Leuconostoc paramesenteroides* R-62 showed the highest binding (%), i.e. 99.74% to Trp-P1,99.65% to Trp-P2 and 45.2-% to Glu-P1. While some strains of bacterial cells (*Bacillus subtilis* and *Pseudomonas fluorescens* and peanut shell effectively bound Trp-P1 and Trp-Ps, rice bran and some gram negative bacterial cells did not bind these mutagens effectively. AS

Listeria

769

Fernandez-Garayzabal (J) and Genigeorgis (C). **Quantitative evaluation of three selective enrichment broths and agars used in recovering *Listeria* microorganisms.** *Journal of Food Protection* 53(2): 1990: 105-110

Three selective enrichment broths (FDA, University of Vermont and Dominguez Rodriguez) and lithium chloride-phenylethanol-moxolactam (LPM) agar, modified McBride (MMA) agar, *Listeria* selective agar (LSAM of Dominguez-Rodriguez), and Brain Heart Infusion (BHI) agar (as reference) were evaluated for their suitability to support the growth of 6 different sp.,/strains of *Listeria* (*Listeria monocytogenes* Scott A, *L. monocytogenes* V7, *L. monocytogenes* VPH-1, *Listeria innocua*, *Listeria seeligeri*, and *Listeria ivanovii*). All *Listeria* strains grew faster and yielded a higher number of cells in FDA enrichment broth. Based on MPN studies, 1 to 2.1 cells of *L. monocytogenes* and *L. innocua* were needed for visible colony formation, on all three selective and BHI agars after 48 h incubation of 37 C. The LPM agar was more inhibitory for *L. seeligeri* and *L. ivanovii* requiring 9.6 and 917 cells, resp., as compared to 1 to 32.7 cells for the other agars. The effectiveness of a particular combination among the selective enrichment broths and agars for recovering *L. monocytogenes* Scott A from inoculated cheese and meat samples was quantitated. Any enrichment broth combined with plating on LPM or LSAM agar gave 1200% *Listeria* recovery as compared to 50 to 67% for plating on MMA agar. Both LPM and LSAM agars have also shown a superior performance to MMA agar in the recovery of naturally occurring *Listeria* from soft cheese and raw meat. The use of secondary broth enrichment step improved the recovery of *Listeria* spp. from meat samples. AS

Pseudomonas fluorescens

770

Roussis (IG), Drainas (C) and Alichanidis (E). **Some properties of extracellular protease from a *Pseudomonas fluorescens* strain.** *Lebensmittel-Wissenschaft und - Technologie* 23(2): 1990: 106-111

An extracellular protease from *Pseudomonas fluorescens* strain *GR83*, isolated from raw milk, was partially purified by precipitation with ammonium sulphate and by chromatography on Sephadex G-100. The protease had a mol. wt. of 38,000 with a K_m value for casein of 0.9 mg/ml. The pH and temp. optima were 6.5 and 39 C, resp. The enzyme seemed to be a thiol protease while its activity was reduced after dialysis against EDTA. The inactivation of protease in phosphate buffer at temp. of 100-140 C followed first-order kinetics with an Ea of 6.37×10^4 J/mol. The remaining proteolytic activity after treatment at 55 C for 5 min was 25%. The enzyme was stabilized by Ca^{2+} at 90 C but not at 55 C. AS

Shigella flexneri

771

Simth (JL) and Dell (BJ). **Capability of selective media to detect heat-injured *Shigella flexneri*.** *Journal of Food Protection* 53(2): 1990: 141-144

Staphylococcus

772

Varadaraj (MC) and Ranganathan (B). **Staphylococcal enterotoxins-methods of production and detection.A review.** *Indian Journal of Dairy Science* 42(2): 1989: 267-276

This review article emphasises the methods of enterotoxin production in lab. media and the methods of entertoxin detection (gel diffusion precipitin reactions, hemagglutination, fluorescent antibody technique (FAT), radioimmunoassay (RIA) and enzyme linked immunosorbent assay (ELISA)). 93 references. BV

Fungi

Mushrooms

773

Kahn (V). **Synergism exerted by 4-tert-butylcatechol and tert-butylcatechol quinone on the rate of DL-dopa oxidation by mushroom tyrosinase.** *Journal of Food Biochemistry* 14(3): 1990: 177-188

4-tert-butylcatechol (t-BC), at concn. ranging from 0.033 to 16.6 mM, has a pronounced synergistic effect on the rate of DL-DOPA oxidation to material absorbing at 475 nm (dopachrome) by mushroom tyrosinase. This phenomenon was found to be due to the ability of t-BC quinone (formed by the oxidation of t-BC by mushroom tyrosinase or by sodium periodate) to oxidize DL-DOPA nonenzymatically. AS

774

Kahn (V). **2,3,4-trihydroxyacetophenone (2,3,4-THAP) as a substrate for mushroom tyrosinase.** *Journal of Food Biochemistry* 14(3): 1990: 189-198

2,3,4-Trihydroxyacetophenone (2,3,4-THAP) can serve as a substrate for mushroom tyrosinase with a K_m value of 1.2 mM. The product(s) formed is yellow, characterized by a peak at 420-430 nm. A lag period in 2,3,4-THAP oxidation to the yellow product(s) in the presence of ascorbate indicates that the initial product(s) is an o-quinone of 2,3,4-THAP. An oxime, characterized by a broad peak at 510-650 nm, is the likely product formed between o-quinone of 2,3,4-THAP and hydroxylamine. The E_m of the o-quinone of 2,3,4-THAP was estimated to be $1.6 \times 10^4 M^{-1} cm^{-1}$ at 425 nm. During relatively long incubation periods, the peak of the yellow product(s) shifts from 420-425 nm to 430-440 nm; the solution remains yellow and transparent for at least a wk and no precipitate is formed. The final yellow product(s) is probably a low mol. wt. polymer of THAP-o-quinone (dimer, tetramer, etc). AS

BIOTECHNOLOGY

Nil

TISSUE CULTURE

Nil

FOOD ADDITIVES

Colourants

775

Sudhir Singh, Khanna (SK) and Mathur (BN). **Safety and biodegradability of synthetic food colours.** *Indian Dairyman* 42(12): 1990: 514-518

A summary of studies carried out on biodegradability of food colours. Covers *in vitro* and animal studies on degradation of synthetic dyes, especially by the gut and intestinal flora and the toxicity of the degraded chemicals on human system. SRA

CEREALS

776

Maciejewicz-Rys (J) and Hanczakowski (P). **Improvement of the nutritive value of cereals by leaf protein supplementation.** *Journal of the Science of Food and Agriculture* 50(1): 1990: 99-104

The gross comp. and amino acid content of the proteins of barley, corn, rye and wheat grains were determined. Leaf protein conc. (LPC) were produced from the green matter of clover, lucerne, barley and rye grass using standard methods and analysed as for the cereal grains. Each cereal was mixed with each conc. at a protein ratio of 2:1, resp. The chem. score (CS) and essential amino acid index (EAAI) of the cereals, the protein conc. and their mixtures were calculated. The biological value (BV) and true digestibility (TD) of all proteins were determined on rats using the Thomas-Mitchell balance method. LPC proteins contained more lysine (4.6-6.0%) but less cystine than cereal proteins (2.8 3.8 and 2.3 2.7

g per 16 g N, resp). The CS and BV of LPC proteins were low (30-40 and 44-58, resp.) because of the low cystine content. Mixing cereals with LPC improved the CS, EAAI, and BV of their proteins. The BV of the protein mixtures was in almost every case higher than that of either protein alone, but the digestibility of the cereal proteins was reduced as a result of admixture with LPC, especially with clover LPC. AS

777
Vidyasagar (K), Premavalli (KS) and Arya (SS). **Effect of oils and packaging materials on the storage stability of insta nutro cereal mix.** *Indian Food Packer* 45(1): 1991: 24-32

Insta nutro cereals (a nutritionally balanced calorie dense product) dry mix along with vegetable oils (hydrogenated vegetable oil, refined cottonseed oil, refined soybean oil and palm oil) were packed in polypropylene (60 μ) and paper (45 G) (PP); Al foil (0.02 mm)-polyethylene (37.5 μ) laminate (PFP) pouches and their storage stability determined. They were stored at ambient temp. (16 - 35 C) and at 37 plus or minus 1 C in incubator and analysed for protein, fat, free fatty acid and anisidine value. Insta nutro mix processed with hydrogenated oil and palm oil had 6 and 10 months shelf life in PP and PFP pouches and 2 - 4 months in soybean and cottonseed oil processed samples. Oxidation rate was more in samples containing unsaturated oils. Anisidine value correlated significantly with sensory scores. Insta nutro mix processed hydrogenated oil and packed PFP pouches remained stable for 10 months. The deteriorated changes were higher in those packed in PP than in PFP. VKR

778
Arya (SS). **Grain based snack and convenience foods.** *Indian Food Packer* 44(5): 1990: 17-38

A variety of snack and convenience foods from grains are prepared at home or produced by small scale artisans/industries in India and not much change has been effected in the method of preparation of these snack items. A brief description about manufacturing process, product quality, packaging and storage have been dealt for products like Shakar paras and namkeen paras, fried Bengal gram products, fried rice and legume combined products, fried and puffed dhals, popped or puffed cereals, expanded cereals and legumes, extruded foods, formulated products, sweet snacks and papads. The convenience foods covered include ready mixes for gulab jamun, idli, rasam, pulav, kichidi, bisibele bhat, sambar, rasam, dalia and halva. Ready to eat products stabilized by antimycotic agent are chapati, parotha and poori, the process know how for manufacturing is already available. Work done on retort pouched food although described in brief, but the work done of late is not much. Work done on canned convenience foods has also been mentioned. Substantial work has been covered in the review about the breakfast cereals which include dalia, rolled oats, cereal flakes, shredded biscuits, cereal granules and sugar coated puffed cereals. KAR

Buckwheat

779
Michael Hederson (H), Michael Eskin (NA) and Borsa (J). **Buckwheat lipoxygenase.Inactivation by gamma-irradiation.** *Food Chemistry* 38(2): 1990: 97-103

Lipoxygenase (LOX) activity was detected in buckwheat extracts, and was shown to have a pH optimum of 6.5. LOX activity was not affected during 6 days of germination. The specific activity increased when ground buckwheat seeds were extracted with 0.01% or 0.1% solutions of CaCl or MgCl, compared to extractions with distilled water or 1.0% solutions of either of these salts. Increase in specific activity was greater in the presence of Ca ions compared to Mg ions. Gamma-irradiation of buckwheat seeds up to 4kGy resulted in a decrease in LOX activity to level of approx. 43% of the control at a dose of 6 kGy. These results suggest that gamma-irradiation reduces LOX activity, but is not likely to completely prevent lipid oxidation in buckwheat. AS

Rice

780
Palaniswami (A), Manickam (A) and Neelakantan (S). **Surveillance of toxigenic fungi and aflatoxins in rice and paddy grains.** *Madras Agricultural Journal* 76(9): 1989: 481-489

The incidence of toxigenic fungi and presence of aflatoxins in 337 samples of paddy/rice grain were assessed, in samples collected from godowns of public distribution system in few districts of Tamil Nadu. They were assessed for colour, off-flavour, caking, insect damage and viable fungi. In rice and paddy combined, fungal contamination was found in 31.45% samples, 13.94% samples were contaminated with toxigenic fungi and 3.56% of samples had aflatoxin. The fungal contamination was greater in paddy (91.48%) than in rice (12.29%) or parboiled rice (14.93%). The major toxigenic fungi isolated include sp. of *Aspergillus* and *Penicillium*. The aflatoxin B_1 level ranged from trace to 40 μ/kg rice and upto 20 μ/kg paddy. KAR

781

Singaravadivel (K) and Pillaiyar (P). **Effect of pressure parboiling on the quality of stored rice (*Oryza sativa*).** *Indian Journal of Agricultural Sciences* 60(10): 1990; 688-690

Six month stored 3 var. of rice ('Adt 36', 'Tkm 9' and 'IR 50') were soaked for different length of time in water/hot-water/as raw or after presteaming. Soaked paddy was steamed with 2 step steam treatment for 10 or 20 min. Soaking for 30 min after presteaming resulted in complete parboiling in 'Tkm 9', but for 'Adt 36' and 'IR 50' the grains need to be soaked in hot water followed by draining and holding for 4-5 h to achieve equal moisture distribution with grains. This resulted in complete parboiling and with a grain moisture less than 30 %. The milling breakage of pressure parboiled rice was 0.5%. The pressure parboiled rice had hydration value and required more cooking time compared to normal parboiled rice. GSR

782

Sundararaj (R) and Sundararajan (R). **Succeptibility of rice (*Oryza sativa*) to angoumois grain moth (*Sitotroga cerealella*) and its field incedence in Tamil Nadu.** *Indian Journal of Agricultural Sciences* 60(10): 1990: 703-704

A systematic, comprehensive survey of pre-harvest infestation by *S. cerealella* of rice in Tamil Nadu covering major crop seasons and 29 var. was made in 1985-86. Field infestation was observed in all the 29 var. The mean relative susceptibility was determined on the number of moths/kg grain which ranged from 0.33 - 54. Among the popular variety the mean number of moths emerged/kg grain sample were 26 ('white ponni'), 8 ('IR 50' and 'TKM 9'), and 5 ('CR 1009'). In another study the mean susceptibility index of the 10 var. was tested by releasing the moths to glass-tubes. It was found that all the 10 var. were attacked by the grain moth and the susceptibility index was 6.49 for 'IR 50' followed by 4.82 for 'Bhavani', 4.06 for 'white ponni', 3.87 for 'Paiyur 1' and 3.68 for 'red ponni'. GSR

783

Bhupal Reddy (T) and Balasubramanian (KA). **Ethylene bis dithiocarbamate (EBDC) residues in polished and unpolished rice, rice bran and husk.** *Andhra Agricultural Journal* 36(4): 1989; 297-300

Ethylene bis dithiocarbamate residue in polished and unpolished rice as well as in bran and husk obtained from paddy crop sprayed with 0.25 and 0.5% concn. of dithane N-45 and dithane Z-78 were assessed. Residue analysis was done immediately after application, and 10 and 20 days after spraying. The residues in polished rice completely disappeared after 20 days of spraying. In unpolished rice the residue after 20 days of spraying ranged between 0.01 and 1.63 p.p.m., higher residue level were observed in higher concn. of treatment. Dithane Z-78 adhered more tenaciously to the unpolished rice than the dithane N-75 even after 20 days of spraying. The EBDC residue recovered from rice bran and husk ranged between 119.35 and 176.37 p.p.m.; washing of rice reduced the residue from 19.25 - 86.23% in different treatments. KAR

784

Wadsworth (JI) and Hayes (RE). **Variation in rice associated with kernel thickness. III.Milling performance and quality characteristics.** *Tropical Science* 31(1): 1991; 27-44

Five lots of rice, two long-grain(Labelle and Lebonnet var.), two medium-grain (Nato and Saturn var.), and one short-grain (S-6 var.) were studied for the variation of milling and quality characteristics associated with kernel thickness. Each lot was separated by rough rice kernel thickness into several fraction using a Carter Dockge Tester with slotted screens. Portions of each fraction were shelled and milled by standard USDA rice inspection procedures to determine milling yields and quality characteristics. Significant differences among the thickness fractions within each lot were found for shelling efficiency, brown-rice yield, total yield, head rice yield, processing loss and quantities of damage and chalky kernels. Significant difference were also found in the germination capacity of various rough rice fraction. Results indicate that the separation of the very thin rice kernels during processing could significantly reduce processing losses and provide raw material for new product. It would also give the processors more flexibility to blend rice to obtain specific quality grades based on % of chalky and damaged kernel. AS

Triticales

785

Kawatra (BL) and Kiran Malhotra. **Effect of cooking process on lysine availability of triticale products.** *Indian Food Packer* 44(5): 1990; 47-49

The effect of cooking on lysine availability from triticale (*Tritico secale* Wittmack) cv. 'TL 419' products like chapati, panjiri, matter and seviyan supplemented with 5-40% Bengalgram flour was studied. The proper ratio of triticale and Bengalgram flour for acceptability was chapati 85:15; panjiri 75:25; matter 90:10 and seviyan 75:25. Losses of availabile lysine was more when triticale products were supplemented with Bengalgram flour as compared to unsupplemented

products. Of the different cooking processes like baking, roasting in fat, deep fat frying, and boiling those prepared in hot fat witnessed higher lysine losses compared to baking and boiling. VKR

Wheat

786
Takruri (HR), Humeid (MA) and Umari (MAH). **Protein quality of parched immature durum wheat.** *Journal of the Science of Food and Agriculture* 50(3): 1990: 319-327

The protein quality of parched immature Durum wheat (frekeh) produced from Dier Alia-2-variety was evaluated. Frekeh from two maturity stages was used one at the end of the stage (FI) and the other at the end of the dough state (F6). Two animal experiments were carried out in which net protein utilisation (NPU) was determined for the two samples and for mature wheat using Sprague Dawley rats, the first for 12 and the second for 11 days. Additionally, the chemical scores for these cereals were calculated. The results indicated that the protein of FL was of higher quality than that of F6 or mature wheat; the protein efficiency ratio adjusted values of F1, F6 and wheat were resp. 2.70, 1.93 and 1.45 and the NPU. Values were 53, 46 and 44 resp. There was agreement between these results and the chemical score values as then were 54, 41 and 42 for F1, F6 and wheat resp. There was significantly higher voluntary intake of cereals based diets in comparison with the casein-based diet (P 0.05). Thus it is shown that frekeh produced from wheat harvested at an early stage of maturity was of higher protein quality than that produced at a late stage of maturity or mature wheat. AS

787
Maniyar (SR), Thorat (SS), Kulkarni (DN), Haridas Rao (P) and Ninkar (DJ). **Evaluation of milling, rheology and breadmaking quality of some new wheat cultivars.** *Indian Miller* 20(6): 1990: 18-23

New wheat cv. ('Ajantha', 'PBN-135', 'PBN-142') developed at Marthwada Agricultural University Parbhani, India, were compared with 2 established cv. ('Kalyan sona' and 'Sonalika') for the milling, rheology and breadmaking qualities. It was observed that var. 'PBN-135' had max. water absorption (66.8%) and var. 'Ajantha' and 'Sonalika' had min. water absorption. Dough stability of 'Ajantha' and 'PBN-135' was similar to local var. The var. 'PBN-142' had comparatively low dough development time. Breads prepared from 'PBN-135' and 'Ajantha' were similar to traditional wheat breads with respect to dough rheology and organoleptic qualities. SRA

Wheat proteins

788
Gabor (E). **Determination of wheat protein by a new spectrophotometric method.** *Acta Alimentaria* 18(1): 1989: 31-35

A new spectrophotometric method was elaborated to determine the protein content of wheat. The principle of the methods is based on the light absorption of the protein solution, which is proportional to the protein quality present. The examined materials was digested with formic acid at 100 plus or minus 1 C for 60 min. After cooling, ethanol and methylene chloride were added to the reaction mixtures. The spectrophotometric solution was made from this suspension by adding formic acid to it. The non-dissolved bran residues were filtered off before measurement of the optical density of the solution. Calibration measurements were carried out by means of the Kjeldahl method for the calculation of protein content. Mathematical evaluation demonstrated the good applicability of the spectrophotometric method. AS

MILLETS

Corn

789
Pollio (ML), Kitic (D) and Resnik (SL). **Comparative study of the rate of water vapour sorption by Argentine maize hybrids and varieties.** *Lebensmittel-Wissenschaft und - Technologie* 23(2): 1990: 158-161

A comparative study of the rate of water vapour sorption of different hybrids and var. of Argentine maize was studied. A one parameter (K) simplified equation derived from Fick's second law was used to analyse the data. The results indicated that rates of water uptake were similar for all hybrids, but significant differences for var. were observed. AS

790
Lue (S),Hsieh (F), Peng (IC) and Huff (HE). **Expansion of corn extrudates containing dietary fiber.A microstructure study.** *Lebensmittel-Wissenschaft und - Technologie* 23(2): 1990: 165-173

Corn meal was mixed with dietary fiber and extruded by a twin-screw extruder. The microstructure of the extruded products containing wheat bran (up to 30%) or oat fiber (up to 20%) was examined under a scanning electron microscope. The results indicated that the degree of extrudate expansion was

dependent on the source and amount of dietary fiber, and was associated with the size of air cells inside extrudates and with the external structure of products. Increasing fiber content produced extrudates with reduced average cell size, increased number of holes on the cell wall, as well as an increased number of apertures on the surface of extrudates. The inert component (fiber) in the feed material resulted in poor formation and low retention of expanded air pockets The overall effect was decrease in radial expansion and an increase in bulk density. An increase in screw speed favoured longitudinal expansion but decreased transverse puffing. AS

791

Mehta (P), Chhabada (M) and Parikh (N). **Studies on weaning gruel from maize (*Zea mays*). I. .Effect of processing technology on viscosity reduction properties, keeping quality and suitability of weaning gruels for maize eating population.** *Indian Journal of Nutrition and Dietetics* 26(11): 1989: 326-334

Plain maize flour, maize flour+green gram dhal flour (70:30 ratio) were prepared with solid concn. of 15, 20, 25% and fermented for 8, 12, 16, and 20 h at temp. of 35, 40 and 45 C. pH decreased and titraable acidity increased with the progress of fermentation in both maize slurries and maize+green gram dhal flour slurries. Viscosity reduced in all slurries at all temp. and all time intervals with the progress of fermentation. But reduction in viscosity was observed in 15% concn. slurries fermented for 8 h at 35 C. In 15 and 20% slurries at any given temp. the % viscosity reduction of cooked paste slurries was highest at 8th h of fermentation. Higher temp. was needed for max. viscosity reduction (84%). Viscosity of maize slurries was high where green gram dhal was added. Maize amylase rich food (ARF) added at 6% level to plain maize flour slurries fermented at 35 C shows max. viscosity reduction (84%) followed by slurries fermented at 40 and 45 C resp. In maize+green gram dhal flour and maize+ARF slurries the max. viscosity reduction (67%) was at 45 C followed by 40 and 35 C. Sensory quality testing showed all the maize flour based mixes had scores well above the required min. of 60 even after 30 days of storing in polythene bags at room temp. Destruction of bacterial contamination on cooking rendered the cooked fermented slurries safe for consumption by children. But intake studies of selected maize based gruels on children showed that all fermented gruel had a significantly higher intake as compared to unfermented maize gruel. Intake was max. in fermented maize flour gruels with maize ARF added to it. It is concluded that fermentation is cost effective, bulk reducing easy acceptable method for preparation of maize based gruels. Addition of pulse improves the nutritional quality of ARF reduces the viscosity. KAR

PULSES

792

Duranti (M) and Giani (D). **Proteolytic events in legume storage proteins.** *Acta Alimentaria* 18(1): 1989: 89-96

The most significant proteolytic events which modify the storage proteins of lupin (*Lupinus albus* L). seed during development to early stages of germination were investigated. Special emphasis was given to globulin 8, the major legumin like globulin of the seed. The first event considered is the post-translation breakdown of legumin precursor polypeptides (M_r around 70 000) occuring during seed development which gives rise to two polypeptides usuallly referred to as legumin acidic (40 000 to 50 000) M_r and basic (19 000 M_r) subunits. The second step is the partial proteolysis of the acidic subunits which can be also achieved step is *in vitro* by incubation with two endopeptidases from lupin resting seed. The role of this further cleavage is unknown, but it can be related to an altered association-dissociation behaviour of legumin oligomer. At early stages of germination the breakdown was more extensive and again only the acidic subunits appeared to be affected by the enzymatic proteolysis. AS

793

Prem Lata Singh and Syed Khalid Ahmad. **Effect of some non-hazardous chemicals on aflatoxin production in pulses.** *Science and Culture* 56(2): 1990: 81-82

5 chemicals (tannic acid, ferulic acid, o-vanillin, sodium chloride and sodium benzoate) were tested for their influence on aflatoxin B_1 elaboration in seeds of chickpea (*Cicer arietineum*), Green gram (*Phaselous aureus*) and lentil (*Lens culinaris*). Green gram was most susceptible to *Aspergillus flavus* infection and allowed max. aflatoxin production followed by chickpea and lentil. Tannic acid and ferulic acid reduced aflatoxin production in the infected seeds of green gram. Sodium benzoate reduced the aflatoxin production by 12 - 20 % in these pulses. In culture medium tannic acid, ferulic acid and o-vanillin showed fungitoxicity but not fungicidal effect. Sodium chloride and sodium benzoate did not show fungitoxic effect. SRA

Beans

794

Sgarbieri (VC) and Galeazzi (MAM). **Quantification and some chemical and biochemical characterization of nitrogenous substance from varieties of common beans (*Phaseolus vulgaris* L.).** *Journal of Food Biochemistry* 14(3): 1990: 233-237

Crude protein, extracted protein, and nonprotein nitrogenous substances were quantified in 55 var. of common dry beans. Crude protein (% N x 6.25) on a dry basis varied from 23.01 to 35.22/5, with a mean value of 28.51%. Methionine varied from 0.40 to 1.73% of the crude protein with a mean value of 0.80%. The ratio of globulin/albumin ranged from 1.00 to 3.31. Thirty per cent of the total N was of laow MW and was lost in the dialysis (MW cut off 8,000 daltons). Electrophoretic patterns (PAGE) revealed from 3 to 11 bands in the globulin fraction and 4 to 11 in the albumin fraction than in the globulin fraction. The globulin fraction from most of the var. was more inhibitory against trypsin than chymotrypsin. On the other hand, in the albumin fraction of the majority of the var. the activity was stronger against chymotrypsin. Hemagglutination titer for 57 var. ranged from 1024 to 32. 8 var. had titers of 1024 and only 4 had titers of 32. AS

795

Awasthi (CP), Agnihotri (B) and Gautam (NC). **Biochemical constituents and cooking quality of dry Indian bean cultivars.** *Indian Journal of Horticulture* 47(2): 1990: 224-227

Ten cv. ('FD-1', 'FD-8', 'FD-10', 'FD-16', 'Siunu', 'FD-60', 'JDL-16', 'L-126', 'L-20' and 'Lalsem') of Indian bean (*Lablab purpureus* (L) Sweet) were evaluated chemically and sensory scoring. The range in values was protein 22.85 - 27.06% (highest in 'FD-1'), methionine 20.06 - 27.63 mg/g N (highest in 'L-20'), tryptophan 18.19 - 22.25 mg/g N (highest in 'L-20'), ash 3.92 - 3.98%, S 0.198 - 0.324, P 0.318 - 083 (highest in 'FD-1') and total phenol 425.04 - 561.24 mg/100g. Biological value range from 45.02 - 46.98% (highest in 'L-20'). Cooking score was ranged from 2.17 - 8.14 (highest for 'FD-1'). Based on the quality characters cv. 'FD-1', 'FD-8' and Siunu possessed lower total phenol and adjudged superior for immediate table purposes whereas 'L-20', 'L-126', 'JDL-16' and Lalsem could be used in only with prior treatments like steeping in water or after sprouting. KAR

Cowpeas

796

Alani (SR), Smith (DM) and Markakis (P). **Changes in α-galactosidase activity and oligosaccharides during germination and incubation of cowpeas (*Vigna unguiculata*).** *Food Chemistry* 38(2): 1990: 153-158

Germination of cowpeas at 24 and 30 C resulted in increased α-galactosidase activity during the first 6 to 12 h and leveled off subsequently. Stachyose content declined by 38% during 12 h of germination at 24 C. Incubation of a cowpea flour paste for 24 h at 24 C resulted in a large reduction of the stachyose and sucrose concn., and in their practical elimination at 34 C. Incubation for 12 h at 24 and 34 C of a cowpea paste made from 6-h germinated seeds resulted in a large decrease in stachyose content. Incubation of flour or germination of seeds effectively reduced the stachyose concn. of cowpeas. AS

797

Vinod Kumar and Nirankar Nath. **Effect of additives in blanching water on quality of dehydrated green cowpea pods.** *Indian Food Packer* 45(1): 1991: 37-41

Various additives were added to blanching water and its effect on colour and rehydration characteristics of dehydrated green cowpea pods cv. 'Pusa Komal' was studied. Pods were blanched for 10 min in boiling media (pH 6.3 - 12.3) and dehydrated to 7.0 - 9.6% moisture at 60 plus or minus 10 C in a cabinet drier. Fresh pods contained 34.0 mg chlorophylls/100 g solids which reduced to 7.93 - 22.49 mg/100 g solids during blanching and drying. On the basis of rehydration ratio, extent of browning, chlorophyll retention, and sensory evaluation of dried product, blanching of green peas in a solution containing 0.1% sodium carbonate + 0.1% sodium bicarbonate + 0.25% NaMs gave the best product. VKR

Horsegram

798

Vijaya Khader, Paul Jayaraj (A) and Venkat Rao (S). **Lipid-soluble toxic factor from horsegram (*Dolichos biflorus*).** *Indian Journal of Nutrition and Dietetics* 26(10): 1989: 297-303

Lipid soluble toxic factor contained in horsegram was fed to mice, rats and chicks and the histological change in different organs was noted. The toxic factor was given at 1-20 mg% in the diet (50-670 mg/kg body wt.) for mice and 25-150 mg% in the diet (30-300 mg/kg body wt.) for rats and changes in liver, stomach, oesophagus, and gastrocnemous muscle in mice and liver and stomach in rats were observed after 8 wk of administration. The toxic

factor damaged the muscle of rats and mice, when injected, and damage was also seen in the skin of rabbit. Chicks usually detoxify the toxic factor. Autoclaving the toxic factor at 10 lb pressure for 30 min partially inactivates the toxic factor, while at 15 lb pressure for 30 min completely inactivates. KAR

Leucaena

799

Navathar (MS) and Jangle (SN). **Effect of soaking and cooking on mimosine content of leucaena seeds.** *Indian Journal of Nutrition and Dietetics* 26(11): 1989: 341-344

Seeds of *Leucaena leucocephala* were soaked in water and mixed with solutions of sodium carbonate, sodium bicarbonate, citrate buffer and calcium sulphate for 4 and 12 h and dry heated at 90 C for 10 and 20 min and cooked for 10 and 20 min. Of the above treatments soaking seeds in 1% calcium sulphate solution showed max. reduction of mimosine from 60 to 8.3 mg/g of whole seed powder. Dry heating alone did not reduce the mimosine content to a greater extent. Cooking alone reduced the mimosine content from 63.0 to 6.3 mg/g of whole powder but cooking the preheated seed reduced the mimosine to 2.2 mg/g of powder from the initial value of 63 mg/g of powder. Soaking in water for 12 h followed by cooking for 15 min reduced the mimosine from 60.0 to 1.1 mg/g of powder. KAR

Peas

800

Hough (G), Alzamora (SM), Chirife (J) and Marini (C). **Verification of a theoretical model for predicting leaching losses of ascorbic acid during water blanching of peas.** *Lebensmittel-Wissenschaft und - Technologie* 23(2): 1990: 126-129

In a previous work by the authors a mathematical model was used to predict leaching losses of water soluble vitamins during blanching of peas. Before confirming predicted values, effective diffusivity of ascorbic acid in peas at 80 C was measured for different var. and maturities. It was found that with total solids between 24 and 28%, and alcohol insoluble solids between 17 and 23%, there were no significant differences between measured diffusivities. Grouping all of the data gave a value of $6.7 \times 10/cm^2 s$ at 80 C. Activation energy of the diffusion process was also measured and gave a value of 6800 cal/mol. In order to confirm predicted results, experimental blanching of peas was performed for different conditions: varying blanching temp. (80-95 C), pea size (4.8-5.7 mm), heat transfer condition static and agitated water and cooling (with and without). Retentions of ascorbic acid were measured and in all cases they closely matched those predicted by the model. Experimental retentions increased with blanching temp. and pea size, and were higher in static as compared to agitated water. Cooling had little effect on retention. AS

OILSEEDS AND NUTS

801

Sattar (A), Jan (M), Ahmad (A), Wahid (M) and Khan (I). **Irradiation disinfestation and biochemical quality of dry nuts.** *Acta Alimentaria* 18(1): 1989: 45-52

The effectiveness of radiation disinfestation of Pakisatani nuts such as almond, groundnut, pine nut and walnut, was studied. Species of insects involved were determined. Concn. of potential nutrients, phytate, total P and Fe contents were determined *Tribolium custaneum* and *Sitotroga cereallella* infested walnut and pine nut while *Cadra cutella* and *Poldia interpunctella* affected almond and groundnut, resp. Irradiation dose of 1.0 kGY completely checked infestation of these nuts. Sensory ratings decreased with advanced storage, and the samples treated at 0.50 kGy were rated higher than others. Peroxidation rate was higher in pine nut and walnut than almond and groundnut. These nuts widely varied in the contents of potential nutrients such as proteins, lipids, mineral matter, fibre and carbohydrates and exhibited wide range values of energy (2533-3102 kJ per 100 g), phytate (274.8-328.5 mg per 100 g), total P (268.5-604.0 mg per 100 g) and Fe (6.6-11.6 mg per 100 g). AS

Coconuts

802

Hammonds (TW), Harris (RV) and Head (SW). **The influence of moisture content on the extraction of oils from fresh, grated coconut.** *Tropical Science* 31(1): 1991: 73-81

At an optimum moisture content of about 11 - 12% about 70% of the oil could be extracted from the coconut kernel gratings at a pressure of 50 psi. At 100 psi, about 77% oil could be recovered. BV

Groundnuts

803

Suryawanshi (JR), Adsule (RN) and Chavan (UD). **Effect of proceeding and storage on phytate, polyphenols and trypsin inhibitor activity in groundnut kernels.** *Indian Journal of Nutrition and Dietetics* 26(7): 1989: 191-195

The effect of roasting and frying with or without prior soaking and storage on the antinutritional factors such as phytate, polyphenols and trypsin inhibitor activity in groundnuts was studied. Groundnut kernels with or without prior soaking in 20% salt solution were roasted at 160 C for 30 min in hot air oven or fried in groundnut oil at 147 C for 10 min and stored at 27 C or 5 C upto 150 days. The kernels from various treatments were analysed for total and phytate phosphorus, polyphenols and trypsin inhibitor activity. Heat treatments caused significant increase in the total phosphorus content of groundnut kernels, the increase being more by roasting than by frying. All the heat treatments caused significant decrease in phytate phosphorus, polyphenols and trypsin inhibitor activity in groundnut kernels. Frying treatment caused relatively more reduction in phytate, polyphenols and trypsin inhibitor activity, than roasting. Soaking prior to frying or roasting resulted in further reduction in these antinutritional factors. Neither the storage period nor the storage temp. had significant influence on the phytate, polyphenols and trypsin inhibitor in heat treated or untreated groundnut kernels. GSR

Groundnut proteins

804

Chiou (RY-Y). **Effects of heat treatments on peanut arachin and conarachin.** *Journal of Food Biochemistry* 14(3): 1990: 219-232

Arachin and conarachin were purified from phosphate buffer (0.20 and 0.05 M, pH 7.9) extracts using ammonium sulphate fractionation at 40 and 60-85% saturation, resp. Characterization on SDS-PAGE gel revealed that arachin was composed of five major subunits whereas conarachin consisted of one major subunit. Methionine, lysine, and 1/2 cystine content of conarachin was, resp. about three-, two- and two-fold higher than in arachin. During dry roasting of whole peanut kernels and lyophilization of peanut extracts at 150 C for 60 min, the nitrogen soluble indexes of arachin and conarachin decreased with time. Changes in conarachin were comparatively higher than those in arachin. When buffered extracts of kernels were subjected to boiling water bath cooking for 60 min, the native protein patterns of arachin and conarachin, as shown on gradient PAGE, varied significantly with heating time. Subunits of arachin detected on SDS-PAGE did not qualitatively vary. AS

Safflower

Safflower proteins

805

Ordorica-Falmomir (C), Paredes-Lopez (O) and Pena (RJ). **Production of safflower protein isolates.Gel filtration and electrophoretic patterns.** *Lebensmittel-Wissenschaft und - Technologie* 23(2): 1990: 122-125

Research work was carried out to characterize safflower proteins by gel filteration chromatography (GFC) and sodium dodecyl sulphate-polyacrylamide gel electrophoresis (SDS-PAGE), since little information is available on these components from this oilseed crop. Safflower meal defatted in the lab. and safflower cake provided by an industrial plant were used for protein isolate production by micellization and isoelectric precipitation. GFC of all isolates and proteins from both defatted meals revealed two major peaks of about 490 and 200 kilo Daltons(KD). Micellization gave samples with more high mol. wt. components than those from isoelectric precipitation. SDS-PAGE patterns of all isolates exhibited 14-16 similar subunits; one or two bands were faint or absent in some samples. A prominent band of 23 kD was common for all proteins. The preparation method of the protein isolate affected protein comp. AS

Soybeans

806

Rama Krishna (HBV), Mital (BK), Gupta (KC) and Sand (NK). **Fatty acid composition of different soybean varieties.** *Indian Journal of Nutrition and Dietetics* 27(1): 1990: 24-27

The fat content in 10 soybean var. ranged from 17.45 to 21.98% (mean 20.08). The ranges for the content of saturated and unsaturated fatty acids were 9.43 to 20.39 (mean 13.49) and 78.52 to 89.57 (mean 84-88) resp. The palmitic acid and stearic acid contents were 8.35 to 19.43% and 0.96 to 3.56% resp. The range for oleic, linoleic and linolenic acid in different var. were 15.03 to 23.75%, 54.73 to 63.96% and 3.85 to 8.31% resp. GSR

Soy products

Soy curd

807

Patel (JR), Dave (RI), Sannabhati (SS) and Dave (JM). **Effect of selected lactic cultures on beany flavour in soy curd.** *Indian Journal of Dairy Science* 412(2): 1989: 230-234

This article deals with the preparation of acceptable quality of soy curd from soy milk with reduction in

cost. Five combination of starter cultures (*Streptococcus thermophilus* HST + *L. bulgaricus*-LBW, *Acidophilus* yoghurt culture, *S. thermophilus* -CH1, + *Lactobacillus bulgaricus*-CH2, domestic dahi culture, *Streptococcus thermophilus*-B-3641 + *Lactobacillus bulgaricus*-B-548) were used for the soy curd preparation. It is found that acidophilus yoghurt culture and HST + LBW showed good results out of five culture in acid production and sensory quality. Spray dried skim milk powder (2.0 to 3.0%) was added for proper setting of soy curd. Soy curd remained acceptable for 20 days at 5 C without any apparent changes in sensory quality. SRA

Soy proteins

808

Horvath (E), Petres (J), Gelencser (E) and Czukor (B). **Effects of extrusion temperature on physical-chemical properties and biological value of soybean protein.** *Acta Alimentaria* 18(3): 1989: 299-311

Three extrusion temp. (120, 160 and 200 C) were applied as a treatment to evaluate their effects on the physico-chemical properties and biological value of full fat soybean flour, extruded in a Brabender extruder. Water absorption capacity increased, fat absorption capacity, emulsion properties and Nitorgen Solubility Index of soy decreased as extrusion temp. increased. The extractability of proteins by the methods of Osborne and Than and Shibasaki, and the quantity of water and NaCl soluble proteins decreased with increasing temp. The buffer containing sodium-dodecylsulphate and 2-mercapto-ethanol was needed to disrupt bonds formed during extrusion. The SH and SS groups contents in extracted protein fractions of extruded soy samples and the gel electrophoretograms showed that extracted protein fractions were affected by extrusion temp. New protein and mostly of smaller mol. wt. appeared. As shown by the results trypsin inhibitors and urease activity, the *in vitro* protein digestibility decreased, *in vivo* biological value increased with increasing extrusion temp. The highest extrusion temp. (200 C) has caused the decrease of biological value. AS

809

Yasumoto (K), Sudo (M) and Suzuki (T). **Quantitation of soy protein by enzyme linked immunosorbent assay of its characteristics peptide.** *Journal of the Science of Food and Agriculture* 50(3): 1990: 377-389

An enzyme linked immunosorbent assay (ELISA) is described for the quantitative measurement of soy proteins in processed food products. The peptide fragment bearing an antigenicity against anti-glycine (soybean 11S globulin) antibody was prified from the trypsin digests of autoclaved glycinin and used as an indicator antigen for soy proteins. ELISA samples were prepared also by combination of autoclaving and tryptic digestion. Quantitation of soy proteins by ELISA was found to resist interference by other food materials, and the ELISA signal was independent of soybean cvs. The ELISA method was evaluated on pork sausages which were prepared in the lab. to contain 0 to 20.8% soy protein isolate. With commercial soy protein isolate as reference standard, the results showed that the detected amounts were in quantitative agreement with the added amounts of soy protein isolate. AS

810

Meena (G) and Usha (B). **Soy protein isolate: Production technology, functional properties, nutritive value and applications.A review.** *Indian Food Packer* 44(6): 1990: 5-22

Soy proteins could be found in the form of flour, grits, concentrate and isolates. The soy protein is unique among plant protein by vertue of its relatively high biological value and essential amino acid. In the present review the soy protein isolate (SPI) production technology, development of modified protein isolate, texturised soy protein isolate: functional properties of SPI including solubility, water absorption, emulsification and emulsion stabilization, aerating, antioxidant and rheological properties; nutritive value and utilization of SPI isolate have been covered. The application of SPI include preparation of meat-like products, dairy products and some bakery products. 121 references. VKR

TUBERS AND VEGETABLES

Root vegetables

Colocasia

811

Manan (JK), Kalra (CL), Kulkarni (SG), Joshi (GJ) and Berry (SK). **Studies on the preparation, packaging and storage of *Colocasia* snack products.** *Indian Food Packer* 45(1): 1991: 49-54

Traditionally deep-fat fried, salted and spiced 'sevian' (Seb, Murku) is prepared from Bengalgram (*Cicer arietinum*) flour (besan). "Sevian' was prepared from *Colocasia* mash after mixing with 15, 20, 25 and 30% of besan. The proximate comp. of the product was determined and sensory quality

prepared from *Colocasia* mash after mixing with 15, 20, 25 and 30% of besan. The proximate comp. of the product was determined and sensory quality attributes evaluated. The product was packed in 150 guage LDPE, 120 guage polypropylene pouches as also in friction top tins and stored at 30 - 35 C and changes in moisture and peroxide value were noted. The initial moisture content (0.9%) of the product rose to 2.8% during 40 days of storage. The peroxide value changed from 0 to 1.07 meq. oxygen/kg of the product during storage. The product made from 80:20 blend of colocasia and besan had an excellent sensory quality appeal in respect of colour, texture, taste and overall acceptability. The product was found acceptable only upto 30 days storage at ambient temp. when packed in 120 guage polypropylene pouches. The product stored still better in friction top tins. Equilibrium relative humidity (ERH) study showed that the product had a critical moisture content 0f 3.6% corresponding to 44% RH, beyond which crispness was lost and colour deteriorated. VKR

Taro

812

Seltzer (RD) and Strumeyer (DH). **Purification and characterization of esculentamin, a proteinaceous alpha-amylase inhibitor from the taro root, *Colocasia esculenta*.** *Journal of Food Biochemistry* 14(3): 1990: 199-217

A proteinaceous alpha-amylase inhibitor from the cormel of taro (*Colocasia esculenta*) was purified by extraction; heat treatment, ammonium sulphate precipitation, and column chromatography on Sephadex G-100, BioGel P-30, and DE-53 cellulose. This protein (aptly named esculentamin) was shown to be an acidic (pI = 4.4) glycoprotein with a carbohydrate content of 3.64% and a mol. wt. of 11,800 daltons. Esculentamin activity was essentially stable to boiling for 3 h (pH 7.0), to a pH range of 2.0 to 12.0 (at 4 C), and to 6 M guanidine hydrochloride and 8 M Urea. Amino acid analysis indicated a predominance of acidic over basic amino acids, while side-by-side neutral and alkaline absorption spectra strongly suggested a lack of tryptophan. "Bifunctional" inhibitory activity towards both α-amylase and proteases was not observed with esculentamin (i.e., it did not inhibit the several proteases tested, viz. trypsin and sutilisin). AS

813

MacLeod (G). **Combined gas chromatography-mass spectrometric analysis of the aroma components of cooked taro (*Colocasia esculenta* L).** *Food Chemistry* 38(2): 1990: 89-96

Using established procedures, volatile components of taro were analysed for the first time. At total of 62 components (c. 95% of the isolate) was positively identified, and a further component (c. 2.3%) was partially characterised. Many of the identified components were classic volatile products deriving from a specific oxidation/degradation. Others were common volatiles deriving from the action of heat on amino acids and/or sugars. The most abundant components was octane (21.10%), and pyridine was present at the unusally high level of 18.69%. AS

Tubers

Cassava

814

Raja (KCM) and Ramakrishna (SV). **Compositional and pasting characteristics of plain-dried and parboiled cassava (*Manihot esculenta* Crantz.).** *Food Chemistry* 38(2): 1990: 79-88

Compositional and pasting characteristics of cassava flour samples prepared from plain-dried and parboiled chips of the M-4 var. were examined. Parboiling reduced the levels of amylose, fat, reducing sugars and mineral matter. The profiles of the major fatty acids, palmitic, oleic and linoleic, remained generally similar in both plain-dried and parboiled samples. Modifications in the pasting properties of cassava flour attained as a results of parboiling were reflected in the relatively low peak/max. paste viscosity, higher paste stability, considerably lower breakdown value (P-H) and higher breakdown ratio (H/P) of the aqueous slurry prepared from the parboiled samples. AS

Potatoes

815

Shashirekha (MN) and Narsimham (P). **Effect of triacontanol on sprout growth in potatoes (*Solanum tuberosum*).** *Journal of the Science of Food and Agriculture* 50(1): 1990: 1-7

The effects of a 3-min dip in various concn. (0.1-100 mg/litre $^{-1}$) of a triacontanol emulsion on sprout growth from single-eye pieces of seed potato (*Solanum tuberosum* L.) tubers were assessed after 10 days, growth in acid washed sand. Treatment effect were compared with those resulting from immersion for 3 min in a mixture of gibberellic acid (6 litre $^{-1}$) and ethrel (4 mg litre $^{-1}$). Triacontanol dips were more effective than gibberellic acid and ethrel. Treatments increased the fresh wt. of sprouts but had little effect on sprout number per tuber fragment. The optimum concn. of triacontanol was 10 mg/litre $^{-1}$. AS

816

Rai (RD) and Verma (SC). **Ascorbic acid content during canning and storage of canned potatoes (*Solanum tuberosum* L.).** *Indian Food Packer* 44(5): 1990: 68-71

The loss of ascorbic acid content of potatoes (cv. 'K. Chandramukhi', 'S. Sindhuri', 'K. Jyoti' and 'ON-1645') treated with calcium chloride during canning and the loss during storage was studied to find out the best suitable var. for canning. Soaking the blanched potatoes with 2-5% aqueous calcium chloride for 1 h prevented sloughing in all the var. While canning, the potatoes lost 27-44% of ascorbic acid, and the loss was more where the initial ascorbic acid content was higher. Calcium chloride treatment resulted in 50-57% loss of ascorbic acid. After storing for 7 months, only 15-16% of the initial ascorbic acid content was left in the tubers. Due to low peeling and triming losses and as also due to their organoleptic qualities, calcium chloride treated cv. 'K. Jyoti' and 'K. Chandramukhi' were found suitable. VKR

Vegetables

817

Jayaraman (KS), Gopinathan (VK), Das Gupta (DK) and Babu Rao (N). **Development of a ready-to-use quick-cooking dehydrated vegetable curry mix (Avial) containing yoghurt and coconut.** *Indian Food Packer* 45(1): 1991: 5-12

A quick-cooking dehydrated ready-mix for avial (combination of several cooked vegetables with a gravy composed of cured, ground coconut and spices) was prepared using a combination of dehydrated vegetables instantised by high temp. pneumatic drying along with additives to improve rehydration and yoghurt (whey dried) and coconut powder besides some spices. Either whole or skimmed milk yoghurt, spray dried alone or hot air dried in admixture with ground coconut, yielded a gravy mix similar in acceptability to the freshly made traditional gravy mix. The gravy mix and dehydrated vegetable mix were packed separately in unit packs of polypropylene (PP) 300 guage pouches. Each of the gravy and vegetables were than packed together in an outer pack of cardboard (CB), metalised polyester (25 micron) laminate. The mix had 12% protein, 24% fat and a colorific value of 450 kcal/100g. It could be rehydrated in boiling water in 10 min. Storage studies showed that when packed first in PP and than in outer wrap of CB, metalised polyester (MP) or paper-aluminium foil polythene laminate (PFP) in air, the product remain acceptable for 6 months in CB and 12 months in MP, and PFP at room temp. and for 2 months in CB and 4 months in MP and PFP at 37 C. Packing under N extended the shelf life to 18 months at 20 - 30 C. KAR

818

Jayaraman (KS), Das Gupta (DK) and Babu Rao (N). **Quality characteristics of some vegetables dried by direct and indirect sun drying.** *Indian Food Packer* 45(1): 1991: 16-23

Carrot and green peas were dried by direct exposure to sun on trays and indirectly on wiremesh trays positioned inside a cabinet solar drier conected to flat place collector. The products obtained by the two method were evaluated for the pigment content, bulk density, drying time and ratio, rehydration characteristics and oxidative changes and compared vis-a-vis the hot air dried product. Drying time as determined by drying curves showed that hot air drying took 6 h for carrot and 7 h for peas as compared to 14 and 15 h in solar cabinet and 11 and 13 h in direct sunlight resp. β-carotene loss was 49 % in direct drying, 31% in solar cabinet dried and 16% in hot air dried product. Drying by direct exposure to sun resulted in development of rancid odour due to accelerated lipid oxidation while in direct sun drying inside the cabinet minimised these changes and gave product as good as artificially dried. VKR

819

Vijaya Sethi. **Evaluation of different vegetables for lactic fermentation.** *Indian Journal of Agricultural Sciences* 60(9): 1990: 638-640

A study has been made on the lactic fermentation of carrot, beet root, spinach, cabbage and tomato under ambient conditions. Fresh and fermented vegetables were analysed for total soluble solids, acidity, pH and anthocyanin pigments. Total bacterial counts and organoleptic evaluation were also done. Results indicated that acidity and microbial load develop faster in pieces than in whole black carrot. But the retention and development of anthocyanin pigments was more in whole black carrot than in pieces. Addition of cabbage increased acidity development in beetroot upto 32 days and decreased later on; it also improved the taste. Addition of mustard increased the shelf life and rate of fermentation except in cabbage, where the fermentation rate decreased. Soybean sauce addition flavoured the fermented cabbage and enhanced the shelf life by 6 months. Rate of acid development was faster in spinach upto 24 days. In greenish red tomato the rate of development of acidity and microbial load was faster in pieces than in whole tomato; but texture and the whole fermented tomato was better than fermented pieces. It was concluded that black carrot, beetroot, beetroot+cabbage(1:1), spinach and tomato, the rate

of acid development does not correlate directly to the bacterial counts to the lactic acid producing bacteria unlike cauliflower when fermented with salt and mustard powder.GSR

820
Kalra (CL). **Role of blanching in vegetable processing.** *Indian Food Packer* 44(5): 1990: 3-16

This review covers the various techniques of blanching like hot water, microwave, fluidized bed, and individual quick blanching. Other aspects covered include cooling after blanching, advantages and disadvantages in blanching, solid losses, blancher effluents, controlling off-flavour and texture and colour changes in blanching. Blanching of individual vegetables has also been reviewed which includes brinjal, bittergourd, brussels sprout, carrot, cabbage, cauliflower, green vegetables, green pea, green bean, okra, onion, spinach and summer squash. 112 references. VKR

Leafy vegetables

Alfalfa

821
Baraniak (B), Baraniak (A) and Bibicz (M). **Protein concentrate from alfalfa and cocksfoot by polyelectrolyte precipitation.** *Die Nahrung* 33(6): 1989: 491-495

Results on the precipitation of leaf protein conc. from alfalfa (*Medicago sativa*) and cocksfoot (*Djactylis glomerata*) by application of polyelectrolytes were reported. AS

Asparagus

822
Zurera-Cosano (G) and Moreno-Rojas (R). **Mineral elements in fresh and canned *Asparagus*.** *Food Chemistry* 38(2): 1990: 113-118

Six essential elements were determined in fresh and canned *Asparagus*, taken at each step of the canning process, by AAS, to evaluate the contribution of these vegetables to the daily intake of these elements in Spain. The concn. of the elements were 225.06 mg/kg, 1.116 mg/kg, 7.761 mg/kg, 731.80 mg/kg, 1.01 mg/kg and 3.455 mg/kg, for Ca, Cu, Fe, Mg, Mn, and Zn, resp., Concn. were compared statistically at different stages of the process. The *Asparagus* tip/rest ratio metal concn. was determined, and a greater capacity for concn. of heavy metals was observed in the tip with respect to the rest of the *Asparagus*. From the mean levels of mineral elements obtained, their daily intake contributions were 637.5 µg/day for Ca, 2.33 µg/day for Cu, 16.25 µg/day for Fe, 190.5 µg/day for Mg, 2.12 µg/day for Mn and 7.25 µg/day for Zn. AS

Tomatoes

823
Petro-Turza (M), Szarfoldi-Szalma (I), Fuzesi-Kardos (K) and Hjajud (F). **Study on taste substances of tomato . I.Analytical investigation into the sugar, organic acid and mineral contents.** *Acta Alimentaria* 18(1): 1989: 97-106

A comparative analytical investigation into the sugar organic acid and mineral contents of two tomato cvs is reported. (one traditional cvs named "K-549" and another one suitable for machine harvesting and named "Makka") and the purees manufactured of them. It was established that more than half of the soluble solids content (56.5% for the cvs "K-549" and 64.1% for the cvs "Makka") was made up of glucose and fructose occurring in a ratio near to 1:1. A slight decrease in the reducing sugar content was observed during puree manufacturing. Within the organic acids which constituted about 10% of the soluble solids content in fresh tomato samples, citric acid and prevailing in both cvs while malic acid was present in traces only. Acid content increased upon evaporation due to the formation of pyrrolidone carboxylic acid. Concn. and qualitative comp. of soluble mineral substances were practically identical in the two tomato cvs and did not change either during evaporation. Total mineral substances amounted to about 7% of soluble solids content and were composed of about 70% of K, about 2% of Mg, 7.5% of phosphate and 20.5% of chloride. It was established as well that mineral substance content and comp. were determined by location and growth conditions but not by cvs. Out of the parameters studied noteworthy differences between the two cvs were found in total and soluble solids content as well as in the ratio sugar/acid. AS

824
Petro-Turza (M), Szarfoldi-Szalma (I), Fuzesi-Kardos (K) and Barath (A). **Study on taste substances of tomato. II.Analytical investigation into the free amino acid, peptide and protein contents.** *Acta Alimentaria* 18(1): 1989: 107-117

The distribution of N-content in two tomato cvs (K-549" and "Makka") as well as in the purees prepared from them is reported. It was established that in fresh tomatoes more than 70% of the N-content can be derived from the compounds present in the serum in dissolved form. The total amounts of free amino acids and within these, the percentage ratios of the individual components

showed characteristics differences in the two cvs., however, in both cvs, glutamic acid and glutamine occurred in the highest quantities. The presence, of peptides in the samples was detected, too. Among the amino acid components of these, aspartice and glutamic acids were prevailing. The results obtained with the amino acid analyser for the fractions separated from the samples were in good agreement with N contents determineend with the Kjel-Foss apparatus. It was established that about 17% of the soluble solids content of tomatoes were made up by free amino acids and 8-11% peptides, while soluble proteins were found in minute amounts only. The considerable deviation of the results from data of the literature can be accounted for by the fact that, for tomatoes, the multiplication factor of 6.25 as generally used, cannot be applied for calculating protein concn. from N-content. The amount of free amino acids decreased in purees by about 20% as related to fresh fruits while the concn. of peptides increased as a result of partial hydrolysis of insoluble proteins. AS

825

Urbanyi (G) and Horti (K). **Colour and carotenoid content of quick frozen tomato cubes during frozen storage.** *Acta Alimentaria* 18(3): 1989: 247-267

One of the most important quality characteristics of tomato is its colour. Thus it was found important to investigate the behaviour during frozen storage of the colour and pigment content in quick frozen tomato cubes, manufactured in increasing amounts in recent years. In a part of the experiments the test material was gained from the same tomato cvs at different stages of maturity, while in the other part the fully ripe fruits of three different cvs were used. The colour of tomatoes, frozen at -30 C and stored at -20 C, was studied by the tristimulus method and the amount of carotenoids by photometry after separation by coloumn chromatography. The colour of the tomato products was found to change continuously during frozen storage. The process appeared in the diminishing of the red character and increasing of the yellow character and simultaneous lightening of the colour. There was no characteristic change in saturation. The extent of change was maturity dependent. A linear correlation was observed between colour and time of storage. In the case of values b*, L* and TCI the correlation was found to be close and significant. The quantity of carotenoids diminshed during frozen storage. The reduction of the quantity of pigments present in the tomato in the largest amount, as well as that of all the carotenoids is in close linear correlation with the storage period. The quantity of the same pigments is in close linear correlation with b*, L* colour characters and the Tomato Colour Index(TCI). Thus, the relatively more rapidly determinable colour characters permit to draw conclusions not only as to the change of colour but to the quantitative change of pigments, too. AS

826

Bhupal Reddy (T) and Balasubramanian (KA). **Recovery of EBDC residues from washed and unwashed fruits of tomato, brinjal, chilli and grape.** *Andhra Agricultural Journal* 36(2-3): 1989: 172-174

Tomato, brinjal, chilli and grape plants were sprayed 4 times each with 0.25 and 0.5% of Dithane M45 and Dithane Z78 at 10 days interval and the last spray was given 20 days prior to harvest. Ethylene bisdithiocarbamate (EBDC) residues were estimated from washed and unwashed fruits immediately after spray, and also 10 and 20 days after spray. In tomato the washed fruits did not show any residue except Dithane Z78 at 0.5% showed traces of EBDC. In brinjal washed fruits were completely free from EBDC. In chilli, washed fruits always contained lower levels of residues. EBDC residue was completely absent in some chilli fruits only. In grape berries Dithane M45 at 0.25% concn. does not get washed easily but at higher concn., it gets washed easily. Dithane Z78 is more prone to removal by washing at both the concn. 0.25% and 0.5%. KAR

827

Vijay Sethi. **Steeping preservation of whole tomato (*Lycopersicon esculentum*) and sweet lime (*Citrus aurantiifolia*).** *Indian Journal of Agricultural Sciences* 60(12): 1990: 847-849

Steeping solutions prepared for tomato contained potassium metabisulphite (KMS) (0.2 to 0.5%) with different concn. of calcium chloride, table salt, sugar, lactic acid and citric acid. Steeping solutions for sweet lime included salt, lactic acid, citric acid, KMS, acetic acid and glycerol. The fruit to steeping solution ratio was 4:5. It was observed that fresh whole tomatoes having 3.81-5.01 Brix, 4.03-4.19 pH, 0.36-0.55% acidity and 0.16-0.23 lycopene (as optical density) could be stored well with good retention of red colour up to 9 months at room temp. with no spoilage in steeping solution containing 2% each of salt and sugar, 0.5% each of citric acid and calcium chloride and 0.2% KMS or in another solution containing 0.5% each of KMS and calcium chloride. Oval shaped tomato retained better texture than round tomato. Increasing the concn. of KMS from 0.2 to 1.0% adversely affected the sensory quality. Fresh lime with an initial Brix of 6.41-9.09, pH of 2.3-2.47, acidity of 4.83-7.89% and vitamin C of 19.05-28.2 mg/100 ml juice preserved well up to 1 yr in a solution containing 3% salt + 0.2% KMS + 0.5% acetic acid + 0.5% lactic acid and

0.2% glycerol: the colour, texture and nutrients were well retained. KAR

FRUITS

828
Khachik (F), Beecher (GR) and Lusby (WR). **Separation, identification, and quantification of the major carotenoids in extracts of apricots, peaches, cantaloupe, and pink grapefruit by liquid chromatography.** *Journal of Agricultural and Food Chemistry* 37(6): 1989: 1465-1473

The predominant carotenoids and carotenol fatty acid ester in extracts from apricots, peaches, cantaloupe, and a var. of pink grapefruit ('Ruby' seedless) have been separated and quantitated on C\sub 18\ reversed-phase high-performance liquid chromatography (HPLC) columns with low and highcarbon loading. Isocratic and gradient HPLC conditions were developed that separated carotenoids from three classes of xanthophylls, hydrocarbon carotenoids, and carotenol fatty acid esters. The xanthophylls were identified as zeaxnanthin and β-crytoxanthin. The hydrocarbon carotenoids were identified lycopene, γ-carotene, carotene, β-carotene, phytofluene, and phytoene, which were accompained by several of their cis stereoisomers. The carotenol fatty acid esters were identified as saturated straight-chain bis(fatty acid esters) of β-cryptoxanthin, lutein, and zeaxanthin, which were shown to be only present in the extracts from peaches. AS

829
Shindon (T), Sasaki (Y), Miki (H), Eguchi (T), Hagowara, K., Ichikawa (T). **Identification of erythritol by HPLC and GC-MS and quantitative measurement in pulps of various fruits.** *Journal of Agricultural and Food Chemistry* 37(6): 1989: 1474-1476

Study confirms the existance of erythritol in pulp by HPLC using CK08SH packed column. 1% phosphoric acid eluent, and differential refractometer and GC-MS using a 5% sp-2340 column and electron-impact ionization mode. Fruits were washed, isolated from peel and then homogenized. Detn. by HPLC revealed 0.0022-0.0047% of erythritol in watermelon, melon, pears, and grapes, and not in apples, banana, cherry and peach. The amount was very small compared to that contained in fermented foods. SRA

830
Gunasekaran, (S). **Delayed light emission as a means of quality evaluation of fruits and vegetables.** *CRC Critical Reviews in Food Science and Nutrition* 29(1): 1990: 19-34

This article reviews the nature and occurence of delayed light emission (DLE), effects of various environmental factors on the intensity of DLE, practical applications of DLE measurements for quality evaluation of fruits and vegetables and outlines the future research needs with the instrumentation aspects associated with developing measurement system for automatic quality evaluation. 68 references. SRA

831
Pruthi (JS). **Need for modernization and partial mechanization of the murabba and candy's industry in India with special reference to ginger preserve and confectionery.** *Indian Food Packer* 44(6): 1990: 51-59

The ginger preserve and candy industry in India continues to be a cottage-scale industry. By well-planned and coordinated R and D programme on horticultural, biochemical, microbiological and technological aspects, the Australian ginger industry has become the world leader in this area. In this paper the author gives the critical appraisal of the developments made by the Australian ginger confection industry. VKR

Apples

832
Andirch (G), Florentini (R), Galoppini (C), Tuci (A), Sommovigo (G), Zinnai (A). **Skin permeability to carbon dioxide of apples harvested at different ripening times.** *Lebensmittel-Wissenschaft und - Technologie* 23(2): 1990: 162-164

Skin permeability to carbon dioxide diffusion as a function of ripening time was evaluated in 'Super Golden Delicious' and 'Red Stark' apples using a kinetic model. The experimental data do not show a statistically significant trend with ripening time and are close to those previously measured for oxygen. AS

833
Kontominas (MG) and Kokini (JL). **Measurements of molecular parameters of water soluble apple pectin using low angle laser light scattering.** *Lebensmittel-Wissenschaft und - Technologie* 23(2): 1990: 174-177

Low angle laser light scattering (LALLS) photometry has been used to measure both the mol. wt. and the mol. wt. distribution of commercial apple pectin after purification by dialysis. The accuracy of the

method was tested using Dextran T-2000 of known mol. wt. The wt. av. mol. wt. of apple pectin was determined to be 5.34 x 10^6 using LALLS and 5.33 x 10^6 using gel permeation chromatography (GPC)/LALLS. The sample was found to be highly polydispersed with a polydispersity value of 15.4. The above mol. parameter values were compared to respective literature values. AS

834

McRae (KB), Lidster (PD), Demarco (AC) and Dick (AJ). **Comparison of the polyphenol profiles of apple fruit cultivars by correspondence analysis.** *Journal of the Science of Food and Agriculture* 50(3): 1990: 329-342

Concn. of the major flavonoids and phenolic acids in the peel and cortex of fruit of eight commercial apple cvs were determined by HPLC. The multivariate statistical technique of correspondence analysis was applied to the polyphenol profiles to describe distinctive groups of cvs and of polyphenols, and their joint correspondences. Cultural and growing conditions had a limited effect on the polyphenol profiles of the cortex and peel. Chlorogenic acid was the principal polyphenol in the cortex with the lowest levels being in 'Red Delicous' and the highest in 'Jerseymac', which were compensated by changes in phlorizin. Cortland had low levels of chlorogenic acid and 'Gravenstein' had high levels, but these were offset by the levels of catechins. The quercetin, rhamnoside, was the principal phenolic compound for the peel data with low levels in 'Red Delicious', Cortland, Sparatan and Jerseymac and high levels in 'Golden Delicious', 'Gravenstein' and 'Northern Spy'. Levels of chlorogenic acid, offset by levels of phlorizin and catechins, distinguished between 'Red Delicious' and 'Cortland'. Rutin was important in distinguishing between 'Jerseymac' and 'Spartan'. AS

Feijoa fruits

835

John Shaw (G), Allen (JM), Yatyes (MK) and Franich (RA). **Volatile flavour constituents of feijoa (*Feijoa sellowiana*).Analysis of fruit flesh.** *Journal of the Science of Food and Agriculture* 50(3): 1990: 357-361

The volatile flavour fraction from the flesh of ripe feijoa fruit (*Feijoa sellowiana* Berg cv Mammoth) has been isolated by high vacuum steam distillation and subsequent liquid-extraction of the volatiles. Analysis by capillary GC and GC-MS led to the identification of 15 constituents of which (Z)-hex-3-enal and isopropyl benzoate are reported for the first time. Methyl benzoate constituted 82% of the volatile flavour extract. AS

Grapes

836

Chikkasubbanna (V), Chadha (KL) and Ethiraj (S). **Influence of maturity of Thompson seedless grape on the wine composition and quality.** *Indian Journal of Horticulture* 47(1): 1990: 12-17

Thompson seedless grapes were harvested randomly at 5 successive weekly intervals of maturity, starting from the stage when the Brix/acid ratio was 15 and analysed for total soluble solids (TSS), pH, reducing sugars, proline, minerals and total acidity. During the progressive harvesting TSS and reducing sugars increased whereas total titratable acid decreased with increase in pH. Total N content increased with maturity. Proline content of grape musts increased with increase in maturity with corresponding decrease in total N. Other minerals like P, K, Ca, Mg, Fe, Zn, and Mn content of the musts increased with maturity of grapes. Total acidity and tartartic acid content in the wine decreased with grape maturity. The alcohol % of the wine increased from 9.00 to 11.83 in 1980 and 10.06 to 13.30 in 1981 with increasing maturity. Sensory ranking of the wines from the 1980 and 1981 season indicated that at a Brix/acid ratio of 30-35, Thompson seedless grapes were excellent for wine making under the climatic conditions prevailing in those yr. KAR

Guava

837

Prabha (TN), Narayan (MS) and Patwardhan (MV). **Flavour formation in callus cultures of guava (*Psidium guajava*) fruit.** *Journal of the Science of Food and Agriculture* 50(1): 1990: 105-110

Explants from guava *Psidium guajava* L fruit, when cultured on Murashige and Skoog media containing different combinations of IAA, NAA, 2.4-D and kinetin, yielded unorganised callus cultures. Light (2000 lux) and kinetin (5 mg liter $^{-1}$) promoted chlorphyllous callus. However, none of the tested variations yielded organised cultures. Increase in kinetin from 0.2 to 0.8 mg litre $^{-1}$ resulted in slight increase in the growth of the callus. There was percepitable guava fruit flavour in all three passages of callus cultures, all of which exhibited a slow growth rate. GC-MS analysis of the volatile flavour fraction of the callus tissue revealed (Z)hex-3-en-1-ol, 3-phenylpropyl acetate, (E)hex-3-en-1-ol, hexan-1-ol, (Z)hex-3-ynyl acetate, (E)hex-2-enal and cinnamyl acetate as prominent peaks. Incorporation of ^{14}C glucose, ^{14}C phenylalanine and 14C acetate from the growth

medium into the volatile fraction of the callus cultures was 0.07, 0.09 and 0.14% resp. during a 4 day incubation. AS

Limes

838
Krishnamurthy (GV), Giridhar (N), Satyanarayana (A) and Venkateswara Rao (M). **Studies on commercial utilization of Rangpur limes.** *Indian Food Packer* 44(6): 1990: 37-41

Physical and chemical characteristics at three stages of maturity of Rangpur limes(*Citus limonia*, Osbeck) were determined for commercial utilization. The green fruits were found suitable for pickle manufacture. The juice (48.8 - 50.2%) from ripe fruit was found to yield good quality squash and cordial. The squash was acceptable upto 9 months storage. The fruits yielded 0.68% of lime oil on steam distillation and spent peels after distillation yielded 22.4% high grade pectin. It is concluded that the Rangpur limes could be commercially utilized for the production of pickles, squash, cordial and pectin and the fruits could be utilized for the production of citric acid, lime oil and pectin in place of acid lime. VKR

Litchi

839
Badiyala (SD) and Awasthi (RP). **Physico-chemical characteristics of some litchi (*Litchi chinensis* Sonn) cultivars grown in Kangra valley.** *Indian Food Packer* 45(1): 1991: 42-45

Studies on yield, ripening period, fruit cracking and physical and chemical characteristics of 9 litchi cv. ('Dehradoon', 'Seedless Late', 'Calcuttia', 'McLean', 'Muzaffarpur', 'Rose Scented', 'Large Red', 'Saharanpur' and 'Seedless Early') were carried out during 1986 and 1987. Fruit wt. was max. in Muzaffarpur (21.3 g); 'Seedless Late' had higher % of pulp (54%) and max. (43.90%) pulp/stone ratio; the T.S.S ranged between 17.33 and 22.30%. The % acidity was max. in cv Calcuttia (0.57%); T.S.S/acidity ratio was highest in cv. Dehradoon (50.55%). Cracked fruits was max. (50.60%) in Saharanpur and min. in cv. Calcuttia (12.89%). The cv. Dehradoon gave highest yield and possessed good quality when cultivated in Kangra Valley of Himachal Pradesh in India, which was followed by cv. Calcuttia. VKR

840
Kahlon (PS) and Bajwa (KS). **Effect of bavistin, wax emulsion and wrappers on the storage life on *Litchi* cv. calcuttia.** *Indian Food Packer* 45(1): 1991: 55-59

Litchi fruits were dipped in Bavistin (Bn) 125 p.p.m, wax emulsion (WE) 6%, and packed with wrappers - unperforated polythene bags (UPPE), perforated polythene bags (PPB), perforated polythene bags + paper cutting (PPB+PC) and kept in wooden boxes and stored at 0 - 3.2 C and 85-90% RH for 40 days. The treatment WE + PPB + PC minimised physiological loss in wt. whereas spoilage was less in fruits dipped in Bn and wrapped in PPB or PPB + PC. Palatability rating was highest for fruits treated with Bn + WE + PPB but the fruit colour retention was lower than WE fruits wrapped in PPB or PPB + PC which retained fruit colour in good condition for 20 days and maintained good palatability upto 40 days storage. T.S.S. and reducing sugar content increased and acidity decreased with the increase in the storage period. Wax emulsion treatment helped to preserve the acidity level in fruits; and these fruits when packed in PPB or PPB + PC was in good condition for 20 days. VKR

Mangoes

841
Stein (ER) and Wolfenbarger (DA). **Methyl bromide residues in fumigated mangoes.** *Journal of Agricultural and Food Chemistry* 37(6): 1989: 1507

Mangoes *Mangifera indica* Linn) were fumigated in temp.-controlled chambers with methyl bromide (MB) at 16, 48, 56, and 64 g /m^3. GC analysis for MB residues in the peel and flesh showed that residue concn. were above 20 mg/kg at 0.17 h after fumigation at the highest doses. One h after fumigation, residue levels were below 15 mg/kg. Analyses of the peel and flesh at 0.17, 1, 2, 5, 24 and 48 h after fumigation indicated that the MB residue levels followed an exponential regression, decreasing rapidly during the first h followed by gradual decline. AS

842
Iyer (CPA), Subramanyam (MD) and Dinesh (MR). **Padiri - a promising mango variety for processing.** *Indian Food Packer* 45(1): 1991: 13-15

'Padiri' is mango var. isolated from a orchard in Mayavaram, Tamil Nadu, India., its quality for processing was assessed. It is an early and heavy yielder with high pulp content (68.1%); low proportion of stone; high total soluble solids (21.8 B); high sugars (18.2%); good pulp colour; good processing quality and has high organoleptic score. VKR

Pineapples

843

Shahabuddin (N) and Hawlader (MNA). **Evaluation of drying characteristics of pineapples in the production of pineapple powder.** *Journal of Food Processing Preservation* 14(5): 1990: 375-391

The drying behaviour of osmosed and fresh pineapples, and the development of pineapple powder for use as dry food ingredients were investigated in this study. It was found that by osmotic dehydration alone 30 - 40% of the water content of pineapples could be removed in a day. The effects of temp. and sample thickeness were evaluated when drying was carried out with air under controlled conditions. A mass transfer model, based on Fick's law of diffusion as applied to thin slab, was used to determine the effective diffusivity by using the experimental data where the shrinkage in sample thickness due to loss of water was taken into account. A power law equation was used to coorelate the shrinkage in thickness with the moisture content of the samples. The effective diffusivity was found to be in the order of 10^{-10} m^2/S. The activation energy for pineapple which was estimated by using Arrhenius equation was found to be 35.5kJ/mol. For the production of pineapple powder hygroscopicity and caking are considered to be the main problem. Chemical treatment with magnesium stearate was found useful at concn. of 1% by wt. AS

Plums

844

Weinert (IAG), Solms (J) and Escher (F). **Quality of canned plums with varying degrees of ripeness. 2.Texture measurements and sensory evaluation of texture and colour.** *Lebensmittel-Wissenschaft und - Technologie* 23(2): 1990: 117-121

Texture measurements with a Kramer shear press carried out on canned plum halves of two Swiss cv at 3 different ripeness stages, showed a significant increase in the firmness of all samples when 500 p.p.m. Ca(II)-ions were added to the 30% sucrose syrup can liquid. In sensory tests, firmer plums were generally preferred over softer fruits. Sensory intensity ratings of colour of canned plum halves were in good agreement with the total anthocyanin content as determined spectrophotometrically. Hedonic colour rating increased with increasing colour intensity. If artificial colouring is to be avoided, ripe fruit of anthocyanin rich plum cvs should be used for canning. The tendency of excessive softening of such fruits can be reduced by the addition of Ca(II)-ions at levels up to 500 p.p.m. AS

Sapota

845

Rama Krishna (M) and Rama Rao (M). **Post harvest changes in sapota under different storage treatments.** *Andhra Agricultural Journal* 36(2-3): 1989: 166-171

Harvested sapota *Manilkara achras* (Mill) was treated with (i) 6% wax emulsion, (ii) covered with polythene, (iii) combination of (i) + (ii), (iv) dipped in 1000 p.p.m. of 8-HQ and covered with polythene and (v) dipped in 500 p.p.m. of gibberellic acid and covered with polythene and stored at room temp. and at 12 C. Data on fruit firmness, driage losses, ripening as indicated by colour changes and Brix, respiration rate, total soluble solids, pectin, shelf-life and spoilage were collected and analysed. Results indicate that the storage life of sapota could be increased at room temp. and at 12 C by treating with 6% wax emulsion and storing in 200 guage polythene covers containing ethylene and carbon dioxide absorbents which delayed the ripening by 10 days and had shelf life of 45 days while the control fruits lasted for only 25 days. All other treatments showed lesser shelf life. KAR

Watermelon

846

Bhatnagar (DK). **Utilization of watermelon rind for jam making.** *Indian Food Packer* 45(1): 1991: 46-48

Peeled water melon rind was processed either alone or along with pink berries of grape, cv. 'Beauty seedless'. The mixed jam had an acidity of 0.6%, pectin content of 1.18% and possessed better consistency, flavour and colour than the jam prepared from rind alone. Both types of jam preserved well for 6 months under ambient storage conditions. Acid content was higher throughout the storage period in the mixed jam. Optical density recorded was higher throughout the storage period for the mixed jam than the pure jam of rind. VKR

CONFECTIONERY, STARCH AND SUGAR

Confectionery

Chocolates

847

De Graff (C), Legger (A) and Roozen (JP). **Anchored ratio scale values in the assessment of perceived sweeteness, bitterness and chocolate flavour**

intensity in chocolate confetti and flakes. *Journal of the Science of Food and Agriculture* 50(3): 1990: 363-375

The sensory profile of a particular food products depends on the context of sensations of the products with which that particular product is compared. This implies that the profile obtained is only valid for the period of time during which the physicochemical comp. of each of the investigated products remains constant. This disadvantages can be overcome by assessing the perceived intensities of the products within the context of clearly defined physicochemical stimuli which are known to elicit a constant sensory impression over a long period of time. In the present study the perceived sweetness of 16 brands of chocolate confetti and flakes was anchored and assessed within the context of different sucrose solutions by 31 subjects. The bitterness and chocolate flavour intensities were anchored and assessed within the contexts elicited by different solutions of a mixture of quinine sulphate and caffeine, and cocoa powder/sucrose solutions, resp. The subjective intensities were assessed on a validated ratio scale by making use of a functional measurement approach. Any changes in the sweetness, bitterness or chocolate flavour intensities of these products are now detectable over a long period of time. AS

Starch

848

Silkestrom (M) and Bjorck (I). **Digestible and undigestible carbohydrates in autoclaved legumes, potatoes, and corn.** *Food Chemistry* 38(2): 1990: 1435-152

The formation of a type of undigestible starch (so-called resistant starch, RS) in autoclaved infant purees and canned foods was studied. The products studied were peas, beans, potatoes and corn. The formation of RS in autoclaved infant purees ranged from 21 to 8% of the total starch content. The formation of RS was more prominent in the product which included peas. Autoclaved infant purees may thus be a significant source of undigestible carbohydrates for infants. In canned legume seeds, the RS content ranged from 1.5 to 3.2% (dwb), thus amounting to approx. 6% of the total starch. The amount of RS was also higher in canned potatoes than in reconstituted mashed potato products. For corn, however, autoclaving resulted in only minor amounts of RS. While the RS content in cornflakes was 1.1% (dwb). AS

Sugar

849

Quinan (PB), Atherton (PG) and Noble (AG). **A wedge wire support for screens in continuous centrifugals.** *Indian Sugar* 40(4): 1990: 217-222

The result of trials carried out to test the performance of the machine fitted with the new wedge wire backing screen is presented. It is indicated that the backing screen achieved a purging efficiency of 90% at massecuite feed rate of 6 t/h. While this was only about 75% of the feed rate achieved in the machine with woven mesh backing at the same purging efficiency. It is regarded as an acceptable standard of performance for a BMAK 1000 centrifugal. By using the wedge wire backing screen less sucrose is lost in molasses and the benefit achieved ranged from about 0-5 unit of purity at a feed rate of 2.5 t/h to 1.0 unit at a feed rate of 4.0 to 4.5 t/h. The wedge wire backing screen has shown no corrosion or mechanical damage after greater than 2000 h of operation and is superior to woven mesh backing. The wedge wire is less subject to blinding from deposits such as syngenite than is the woven backing. SRA

850

Jatinder Kapur and Kanwar (RS). **Keeping quality of gur in relation to its inorganic constituents.** *Indian Sugar* 40(4): 1990: 235-237

Jaggery prepared from sugarcane cv. 'COJ 76', 'COJ 78', 'COJ 64', 'COJ 79', 'COJ 67', 'COJ 77', 'COJ 81', and 'CO 1148', were studied for their keeping quality as influenced by their inorganic constituents. Gur(Jaggery) from sugarcane var. 'COJ 79', 'CO 1148', and 'COJ 77' contained higher Ca, Mg, and chloride and absorbed more moisture during storage resulting in higher deterioration with respect to sucrose, purity and reducing sugars. Var. 'COJ 78' and 'COJ 64' are excellent, 'COJ 76', 'COJ 67', 'COJ 81' are good, 'COJ 79', 'CO 1148' are medium and 'COJ 77' is poor. Colour deterioration in jaggery is dependent on any factors studied. Jaggery prepared from var. 'COJ 64' and 'COJ 81' which lost more transmittance on storage contained higher amounts of N and Fe. SRA

BAKERY PRODUCTS

Breads

851

Benedito De Barber (C), Prieto (JA), Collar (C) and Barber (S). **Isolation, purification and determination of low molecular weight peptides from bread dough.** *Acta Alimentaria* 18(1): 1989: 53-63

Efficiency and suitability of different solvents, 1 mol $^{-1}$ acetic acid (i), distilled water (ii) and 70% ethanol (iii), for the extraction of low mol. wt. peptide fraction from unfermented wheat flour dough are tested. Purification of dough soluble fraction (SN) was carried out following the sequence: ultrafiltration (i, ii) or absolute ethanol precipitation (iii), ion exchange chromatography on Dowex 50W-X2, mol. exclusion chromatography on Sephadex G-10 and ligand exchange chromatography on Cu^{2+} -Sephadex, for each solvent tested. Low mol. wt. peptide content was estimated in each purified extract by analysing primary amino nitrogen (AN). Results obtained show that the methodology used is suitable for the isolation and purification of low mol. wt. peptides being their estimated content, larger in the acetic acid extract, 32.6 mg per 100 g dough, d. b. (i), than in the other extracts: 24.0 mg per g dough, d. b. (ii) and 26.9 mg per 100 g dough, d. b. (iii). AS

MILK AND DAIRY PRODUCTS

852

Paten (SS) and Wilbey (RA). **Heat exchanger performance.γ-glutamyl transpeptides assay as a heat treatment indicator for dairy products.** *Journal of the Society of Dairy Technology* 42(3): 1989: 79-80

Whole and skimmed milks were subjected to a range of high temp. short time treatments using a pilot scale plate heat exchanger. γ-Glutamyl transpeptidase activity was assayed in the milks and the residual activities compared against the holding temp. and total heat treatment. There was no residual activity following treatments of 78 C for 15 seconds, a total heat treatment 8.2 times more sever than that of a hold of 15 seconds at 72 C. AS

853

Bradley (A). **Dairy products.What the consumer wants.** *Journal of the Society of Dairy Technology* 42(3): 1989: 77-79

854

Fryer (SM) and Forde (K). **Impedimetric procedures for estimating total bacterial numbers and coliforms in powdered dairy products.** *Journal of the Society of Dairy Technology* 42(3): 1989: 88-89

855

Agrawal (S), Garg. S. K. and Duttan (SM). **Microbial β-galactosidase. Production properties and industrial applications.A review.** *Indian Journal of Dairy Science* 42(2): 1989: 251-262

This review covers sources of β-galactosidase (plants, animals and microorganisms) production, purification and properties of β-galactosidase (mol. wt. substrate specificity, optimum temp. thermal stability, optimum, pH, pH solubility, metal ions, activators and inhibitors) immobilization of the galactosidase (adsorption, convalent bonding, gel entrapment, microencapsulation, containment within semipermeable membrane and hollow fibres) application (milk and whey). 265 references. SRA

856

Christie (IS), Bhadania (AG) and Shah (CM). **Steam piping system for dairy plant.** *Indian Dairyman* 42(10): 1990: 413-417

Design and layout of piping system, expansion properties of pipes, types and materials suitable for piping, control and distribution of steam flow, valves, pipe joints and post erection testing are the aspects briefly described. SRA

857

Thomkinson (DK) and Mathur (BN). **Stability of fatty acids and nutritional adequacy of PUFA rich infant formula during storage.** *Indian Journal of Dairy Science* 43(2): 1990: 203-206

In view of the nutritional role of PUFAs in the development of central nervous system during infancy, this study was undertaken to determine the oxidative stability aspect. During the storage (at 37 C) of infant formula prepared by the incorporation of PUFA rich vegetable oils, a gradual decrease in the content of monounsaturated fatty acids (12:1, 14:1 and 16:1) was observed. Amongst di-unsaturated fatty acids (14:2 and 18:2) oxidation was observed at steady rates during storage. The oxidation rate of tri-unsaturated fatty acids (18:3) was found to be the lowest. Results obtained during this investigations indicated that with initial linoleate content of 320mg/100 Kcal, adqeuacy of essential fatty acids could be ensured upto 9 months of storage at 37 C, so as to meet the prescribed nutritional standard. AS

858

Jain (SC). **Nutritional security through dairy products.** *Indian Farming* 40(8): 1990: 25-30

The concept of nutritional security, dairy products and purchasing power, targets for the turn of the country, scenario of dairy products, milk grid for nutritional adequacy, modern advances in milk processing, dairy development are the aspects considered in this article. BV

859

Keogh (MK). **Anhydrous milk fat. 5.Deep fat frying.** *Irish Journal of Food Science and Technology* 13(2): 1989: 129-140

Oxidised and rancid flavours were not detected in potato chips deep-fat fried in butteroil even after 4 frying days, despite increases in some chem. indices of off-flavour (TBA, PV, FFA) in the oil. The initial smoke point of silicone-treated butteroil was lower than treated corn oil (187 C vs 220 C) and decreased by a further 15 C in both oils over 4 frying days. Silicone addition (2 mg/kg) raised the smoke point of butteroil by 7 C. The smoke point of silicone-treated butteroil was also raised by partial neutralisation (6 C) and by blending 1:3 with corn oil (12 C). A major loss of colour occurred in butteroil during the first day of frying. This loss was reduced by blending with corn oil and by antioxidants. The 1:3 blend with corn oil contained some suspended milk fat solids at room temp. These were eliminated when a 20 $Degree$ C slip point fraction of butteroil was used. AS

860

Byrne (RDJr) and Russell Bishop (J). **The Limulus amoebocyte lysate assay and the direct epifluorescent filter technique as estimators of potential shelf-life of pasteurized fluid milk.** *Journal of Food Protection* 53(2): 1990: 151-153

The Limulus Amoebocyte Lysate Assay, Direct Epifluorescent Filter Technique and modified Psychrotrophic Bacteria Count were used to indicate potential shelf-life of pasteurized fluid milk. Commercial whole milk samples, stored at 7 C, were analyzed for bacterial and biochemical parameters, as well as for potential shelf-life by daily sensory evaluation. Each sample was evaluated before and after the following preliminary incubations: milk alone, milk with benzalkonium chloride, milk and broth, and milk and broth with benzalkonium chloride. The Limulus Amoebocyte Lysate Assay, Direct Epifluorescent Filter Technique, and modified Psychrotrophic Bacteria Count in conjunction with the preliminary incubations, produced relatively high correlations to shelf-life (-0.78, 0.85, and 0.86 resp.). Thus, these bacterial detection techniques could be used as rapid methods of shelf-life estimation. AS

861

Senyk (GF), Davidson (JH), Brown (JM), Hallstead (ER) and Sherbon (JW5). **Comparison of rapid tests used to detect antibiotic residues in milk.** *Journal of Food Protection* 53(2): 1990: 158-164

Five rapid methods for detection of antibiotics in milk were compared. The *Bacillus stearothermophilus* var. *Calidolactis* disc assay was also performed on the same samples. The rapid methods were: Angenics Spot Test, Charm II, Delvotest P, Penzyme Farm, and Penzyme Lab III. Ten antibiotics (penicillin G, cephpirin, cloxacillin, ampicillin, streptomycin, chloramphenicol, erythromycin, novobiocin, tetracycline, and gentamicin) were used individually to spike 8 raw milk samples at 5 levels of antibiotic. Antibiotic levels were chosen that would result in zones of 16 mm, 16 mm, and 16 mm on the disc assay. Only the disc assay, Charm II and Delvotest P were compared on non-beta-lactam antibiotics. A small percentage of milks with no antibiotic added tested positive with the Charm II and Penzyme Lab III. On combined data for penicillin G, cephapirin, and cloxacillin, for which all method were compared, the percent correctly categorized as pass (below actionable) for the 16 mm zone spiked level, reject or caution at the 16 mm zone level, were: Angenics 79, 83, 100; Charm II 66, 92, 100; Delvotest P 74, 93, 100; Disc Assay 100, 74, 100; Penzyme Farm 93, 61, 92; Penzyme Lab III 81, 78, 100 resp. In most cases the rapid methods showed greater apparent sensitivity than the disc assay and did not fail to reject milks spiked with antibiotic in excess of the 16 mm zone level. AS

862

Jaeggi (NE), Bruynner (R) and Schmidt-Lorenz (W). **DEFT-technique in the analysis of foods. II.Agreement with the standard plate count.** *Acta Alimentaria* 18(1): 1989: 79-88

A var. of foods was analysed by the direct epifluorescent filter technique (DEFT) after attaining filterability through prefiltration and enzymatic digestion. DEFT-counts of pasteurized milk, pasteurized cream, minced meat and frozen fish were in agreement with the results of the standard plate count, whereas correlation was low in precooked pasta, frozen peas, patisserie and canned ravioli. Reasons for low correlations between the two methods are discussed. Variation of the DEFT-count is predominantly caused by the uneven distribution of microoorganisms on the membrane filters. A sampling scheme using duplicate filters with 15 counts per filter reduces the standard error of the mean count to below 20%. AS

863

Beever (PF) and Crowhurst (D). **Fire and explosion hazards associated with milk spray drying operations.** *Journal of the Society of Dairy Technology* 42(3): 1989: 65-70

Recent reports in the literature indicate that incidents involving fires and explosions in the spray drying of milk products are increasing in number. While milk powder is not highly explosible, the conditions for a dust explosion, apart from the ignition source, are almost always present in certain areas of spray drying system during its normal operation. Self-ignition of deposits is known to be possible at the high temp. in a spray drier. At best, this can cause product degradation and discolouration and at worst it can provide the source of ignition for an explosion. This paper is an attempt to draw together recent work on fire and explosion prevention and protection for milk powders. AS

864

Knight (AH) and Fryer (SM). **The development of heat-resistant phosphatase activity in raw milk.** *Journal of the Society of Dairy Technology* 42(3): 1989: 81-86

The detection of phosphatase activity is used as a legal test to determine whether milk has been adequately pasteurized or whether it has been contaminated with raw milk. Occasional failures of the Milk Regulations phosphatase test were experienced by a processing dairy from stored silo milk. Trials demonstrated that the phosphatase was heat resistant and associated with a pasteurization-sensitive, psychrotrophic organism isolated from one supply. The standard total viable count at 30 C (TVC) of the supply was satisfactory at 4.59 log cfu/ml: however, the psychrotrophic count at 7 C was much higher at 5.61 log cfu/ml. The test milk after storage produced sufficient heat-resistant phosphatase activity to give a test failure when the psychrotrophic count reached about 7.09 log cfu/ml or greater. The occurrence of a failure was dependent on the initial numbers of psychrotrophic bacteria, the amount of dilution with other milks and the storage time before processing. The psychrotrophic count of the test milk and the count of the phosphatase-producing isolate were found to increase by approx. one log cfu/ml each day on storage at 4 C. This investigation has shown that a phosphatase failure may indicate the development of microbial phosphatase rather than a process failure. A retest after lab. pasteurization of any sample failing the test will assist in identifying any microbially produced heat-resistant phosphatase activity. While a TVC at 30 C will normally be expected to count most types of psychrotrophic organisms, this investigation has shown that on this occasion it did not detect specific psychrotrophic organisms which had contaminated the milk. AS

865

Reddy (PS), Reddy (CR), Sastry (PN) and Krishnaiah (N). **Studies on the formulation and shelf-life of milk base agar junket.** *Indian Journal of Dairy Science* 42(2): 1989: 394-395

The meat pH and acidity of milk junket was found to be 6.53 and 0.119% resp. Max increase in acidity and reduction in pH value was noticed in samples with sorbic acid (SA) while the increase was min with sodium metabisulphate (SMDS) and intermediate with combination of SA and SMS. Acidity increased with longer storage period, but slower when preservatives were added and stored at refrigeration temp. SA (0.1%) alone and a mixture of SA (0.05%) and SMS (0.01%) controlled the changes in pH and acidity effectively. Under atm. storage the milk junket was acceptable for 2 days without preservatives and 3 days with preservatives with scores of 90 and above. The refrigeration enhanced the keeping quality to 4 days for the preserved product. SRA

866

Ghodeker (DR) and Nambudripad (VKN). **Incidence and type of *Staphylococcus* species in dried milks.** *Indian Journal of Dairy Science* 42(2): 1989: 396-398

The present study reports that more stringent sanitation practices should be followed by the dairy plants to eliminate staphylococci completely from dried milk and also holding of reconstituted milks before processing should be avoided. SRA

867

Pal (PK), Battacharya (AM), Das (MK) and Bandyopadhyay (TS). **Rapid detection of added sugar in milk.** *Indian Journal of Dairy Science* 42(2): 1989: 405

A simple, accurate and rapid test for detection of added sugar in milk which can be used as platform test is presented. It can detect upto 0.05% added sugar in milk. The milk preserved in formalin can also be tested without interference of formalin. BV

868

Sen (DC), Bhanumurthi (JL) and Ghodekar (DR). **Whey protein nitrogen content and bacteriological quality of dried buffalo skim milk.** *Indian Journal of Dairy Science* 42(2): 1989: 235-240

The results on the whey protein nitrogen (WPN) content of skim milk powder manufactured from buffalo milk using a range of air inlet temp. 180, 190, 195 and 200 C, and three fixed air out let temp. 90, 95, and 98 C for each air inlet temp. showed considerable variations in WPN content of conc. milk. The total solids in conc. milk varied from 40.0 and 41.0%. The lowest air inlet temp. gave max.

WPN content. The mositure content of powder reduced with rise of air inlet temp. during drying and while the solubility index increased. The total viable, coliform and staphylococcal counts of concentrated milk were higher than the dried milk. The problems in the manufacture of low heat skim milk powder for achieving a satisfactory bacteriological quality are discussed. SRA

869

Wadhwa (BK) and Jain (MK). **Lactones in milk and milk products. Part III.Role in flavour development. A review** *Indian Journal of Dairy Science* 42(2); 1989; 206-209

48 references. BV

870

Jandal (JM) and Rai (T). **Compositional changes in milk as affected by the addition of some chemical preservatives and subsequent stroage.** *Indian Journal of Dairy Science* 42(2); 1989; 203-205

The milk samples preserved with formulation did not show any visibile change in colour and physical appearance for the storage period of three months. All the milk samples preserved with mercuric chloride at 0.4% level developed black colour at the bottom and along sides of bottle after 45 days. No colour change was observed at 0.6% level, but a white sediment was settled at bottom. The milk, on storage with 1:1 mixture of potassium dichromate (0.4%) and mercuric chloride (0.6%) showed development of orange-yellow colour in the begining later turned towards yellowish green after 30 days of storage. The increase in preservative concn., increased the intensity of green colour and with progressive storage. There was proportionate increase in SNF content in the begining on addition of solid preservated, but the fat and SNF content were not affected during storage. On addition of preservatives the whey proteins content decreased initially, later increased (60-200%) throughout the storage period. SRA

871

Abichandani (H) and Sarma (SC). **Power requirement during concentration of milk and cream in horizontal thin-film scraped surface heat exchanger.** *Indian Journal of Dairy Science* 42(2); 1989; 155-158

This study aims to develop an equation in Box-Wilson model to predict power consumption during evaporation in horizontal thin flim scraped surface heat exchanger (SSHE) and also to examine the effect of process variables such as mass flow rate, number of blades and rotor speed on power consumption. No significant increase in power consumption due to increase in mass flow rate of fluid was noticed. However, it increases appreciably with increase in rotor speed and number of blades. BV

872

Singh (RRB) and Patile (GR). **Storage stability of UHT buffalo milk. I.Change in physico-chemical properties.** *Indian Journal of Dairy Science* 42(2); 1989; 150-154

Some of the vital physico-chemical changes associated with Maillard type of reactions, oxidative deterioration of fat, pH profile and colour characteristics in UHT buffalo milk during storage is studied. UHT buffalo milk processed in direct type plant at 140 C for 2 sec. and packed in waxed paper/polyethylene laminated tetrapak and stored at 30 C showed gradual increase in both free and total hydroxymethyl-furfural (HMF). The free HMF increased from 1.296 and 1.949 μ mol/l for 5% and 6% fat milk to 5.54 and 6.52 μ mol/l resp. after six wks of stroage. Increase in total HMF was from 5.127 and 8.892 μ mol/l to 17.049 and 22.382 μ mol/l resp. for both 5% and 6% fat milk. After same storage duration the thiobarbituric acid value increased from 0.046 and 0.047 to 0.064 and 0.074 for 5% and 6% fat UHT buffalo milk resp. Acid degree value (ADV) increased from 4.2 and 3.75 to 6.15 and 5.87 resp. for 5% and 6% fat UHT milk. The pH value dropped from 6.8 to 6.7 and 6.6 for 5% and 6% fat UHT milk resp. for 6 wks of storage. For first 3 wks the reflectance of UHT buffalo milk did not change, but dropped from initial 11.1% to 5.5 and 31.3% resp. for 5% and 6% fat milks. In general, UHT buffalo milk showed faster deterioration during storage as compared to cow milk. SRA

873

Aneja (RP). **Processing and distribution of buffalo milk.** *Indian Dairyman* 42(11); 1990; 466-470

The place of buffalo as milk producers, contribution by buffalo to Indian milk production, buffalo milk comp., processing methods; preparation of milk and fermented milk products, conc. and drying of milk, recombination of milk to powders, preparation of butter, ghee/butter oil are the aspects covered. SRA

874

Rai (CK) and Dwivedi (HB). **To study the bacteriological quality of milk supplied in Kanpur city by different sources.** *Indian Dairyman* 42(12); 1990; 520-523

The bacterial presence in milk supplied by the University Diary farm, Milk Board, Hawker (contractors) and Town dairies was assessed by standard plate count, coliform count and 1 h

resazurin reduction test. The ratio between total counts and coliform counts in the milk was not constant. Based on the bacteriological quality, the milk were placed in the following order of superiority: Milk Board University Dairy Town Dairies Hawker. SRA

875

Upadhyay (KG). **Pretreatments of milk for manufacture of dried milks and their significance.** *Indian Dairyman* 42(12): 1990: 524-537

In dried milk manufacture the pretreatments given to raw milk will influence to a great extent the physical, chemical, microbiological and organoleptic characteristics. The pretreatments included are filtration/centrifugation; standardization of milk; pretreating or forewarming of milk done either before or after concn., preconcentration and homogenization. SRA

876

Sinha (RN) and Sinha (PR). **Rapid methods for the detection of coliforms in milk and milk products.** *Indian Dairyman* 42(10): 1990: 427-432

Authors review developments in methods for speedy detection of coliforms in milk. Tests like Bactostrip method, little plate method, Rubrognst TTC and biostimulator, fluorescent antibody technique (FAT), limulus test, direct-epifluorscent filter technique (DEFT), radiometric method, gas chromatographic technique and chemiluminescent methods are briefly indicated. Firefly luciferase ATP assay, luminochemiluminescent bacterial iron parphyrin assay, chemiluminescent immunoenzymatic assay, are the methods where light could be used to detect microorganisms. Impedimetric technique involving the measure of electrical conductance in the culture media, enzymatic methods, nitrate reduction test, rapid coliform test developed at the National Dairy Research Institute, Karnal(India) and methods for the detection of injured coliforms are also covered. 5 references. SRA

877

Prasad (R) and Pandita (NN). **Cholesterol content of milk and its fractionation during processing.** *Indian Journal of Dairy Science* 43(2): 1990: 190-193

878

Sakkarvarthi (S), Mathur (BK) and Malik (RK). **Bacteriological quality of buffalo milk in relation to processing at high temperatures.** *Indian Journal of Dairy Science* 43(2): 1990: 207-212

The effect of bacteriological quality of buffalo milk from organised and unorganised sector in relation to processing at high temp. was studied. Total viable count and spore count for buffalo milk samples from unorganised sector was found to be higher as compared to cow and buffalo milk samples from organised sector. Consequent upon storage of fresh raw milk of 3 types at refrigeration temp. (7 C) for 1, 3, 5 and 7 days, many fold increase in psychrotrophic count (PC), proteolytic psychrotrophic counts (PPC) and lipolytic psychrotropic count (LPC) was observed. Geometrical increase in PC, PPC and LPC led to a decrease in pH of all the samples of 3 types of milk and that on 5 day of refrigerated storage, the pH values were around 5.0. Increase in PPC led to increase in proteolysis. After 7 days of storage, an extensive proteolysis was detected in all the samples of milk. But it was comparatively more in buffalo milk samples from unorganised sector. Increase in viscosity was directly related to the duration of storage. A gradual decrease in heat coagulation was observed upto 3 days of storage while it decreased rapidly after 5days of storage at 7 C. AS

879

Sharma (RK) and Dutta (SM). **Immobilization of $beta$-galactosidase of *Streptococcus thermophilus* on DEAE-cellulose.** *Indian Journal of Dairy Science* 43(2): 1990: 213-216

$Beta$-galactosidase of *S. thermophilus* was immobilized on DEAE-cellulose by covalent bonding. A slight shift in optimum pH and temp. of the enzyme was observed as result of immobilization. The immobilized enzyme was less stable at pH values above its optimum pH. Thermostability of the enzyme decreased due to immobilization. More than 60% lactose hydrolysis was achieved in 6 h in case of lactose and aqueous solutions. In case of milk, nearly 25% lactose hydrolysis was achieved in 4h. AS

880

Moti Ram and Joshi (VK). **Heat stability of milk as affected by proteose-peptone components during cold storage.** *Indian Journal of Dairy Science* 43(2): 1990: 217-219

Addition of buffalo proteose (BP) and buffalo milk proteose-peptone (BPP) components -3, -5 and -8 fractions in the concn. of 0.5 to 2.0 mg/ml buffalo milk decreased its Heat Cogulation time (HCT) at 140 C in the range of 2.9 - 38.1%. Such samples were also stored at 4 - 6 C and examined for their HCT at the intervals of 24, 48 and 72 h. The percent decrease in the heat stability of buffalo milk was found to be in the range of 0.4 - 40.3% at 24 h of storage and 1.5 - 39.5% at 48 h. After 72 h of storage

a slight increase (+ 2.8%) in the heat stability of the buffalo milk was observed in case of samples containing added components-3 fraction only upto a concn. of 1.5 mg/ml whereas at its 2.0 mg/ml added concn., the buffalo milk samples showed a decrease of about 8.5% in the heat stability even at 72 h of storage. Samples containing the added components-8 fractions showed least HCT in comparision with components-5 and followed by BP. Among these fractions, components-3 fraction decreased heat stability to the least extent. The destabilization effect was proportional to the concn. of the added fraction. Cow milk samples behaved differently as compared to buffalo milk. Addition of BP and BPP components fraction to cow milk increased their HCT significantly. The average HCT increased from 10.6 - 124.6%. Component-3 fraction increase cow milk heat stability the most followed by BP than component-5 and -8 fractions resp., during 24, 48 and 72 h of storage at 4 - 6 C. AS

881

Ghatak (PK), Bandyopadhyay (AK) and Gupta (MP). **Heat stability and proteolysis of buffalo milk as affected by chilling treatment.** *Indian Journal of Dairy Science* 43(2): 1990: 247-248

Milk products

882

Kneifel (W), Ulberth (F) and Hoch (G). **A rapid colorimetric method for the estimation of cocoa content in milk powder cocoa mixtures.** *Lebensmittel-Wissenschaft und - Technologie* 23(2): 1990: 189-191

It is essential for chocolate producers to establish accurately the amount of cocoa solids in milk powder-cocoa mixtures. Chromatographic procedures based on the detection of specific cocoa alkaloids are usually used for the quantification of the proportion of cocoa powder. Alternatively, light-reflectance intensity can be utilized as an index for estimating the cocoa content of the blended powder. For this purpose a method using a simple filter colorimeter has been described. With this technique, within the range of 2-10% cocoa solids, a max. deviation of plus or minus 09.4% from the actual cocoa content was observed. These results are comparable to those obtained with an established HPLC method. AS

Butter milk

883

Chopra (R) and Gandhi (DN). **Factors affecting the antibacterial activity of fermented beverage prepared from sweet cream buttermilk.** *Indian Journal of Dairy Science* 42(2): 1989: 406-408

The production of antibacterial principle in fermented beverage prepared from sweet cream butter milk in specific with incubation temp. The use of whey as blending medium induce higher antibacterial property and the antibacterial principle in heat stable and in not lost upon storage of fermented product for one month at 5 C. SRA

Cheese

884

McNeill (GP) and Connolly (JF). **A method for the quantification of individual free fatty acids in cheese.Application to ripening of Cheddar-type cheeses.** *Irish Journal of Food Science and Technology* 13(2): 1989: 119-128

A method was developed for the quantitative recovery and estimation of individual free fatty acids (FFAs) in cheese. The method was applied to the measurement of individual FFAs during ripening of Cheddar, Cheshire, Caerphilly and Swiss-type cheese (Emmental). In freshly-manufactured Cheddar-type cheeses the levels of butyric (C4:0) and caproic (C6:0) acids were low while levels of longer-chain-length FFAs were considerably higher. During ripening at 8 C the levels of all FFAs increased but C4:0, C6:0, C8:0, C18:2 and C18:3 increased at relatively faster rates. Freshly-manufactured Emmental contained high levels of all FFAs and rates of production during storage were considerably higher than those for most of the Cheddar-type cheeses. Three Cheddar cheeses were also analysed for protein breakdown and examined by a trained cheese grader for flavour and texture. Flavour development appeared to be more closely related to short-chain FFA production than to protein breakdown. Further analysis of FFA production revealed a preferential release of C4:0 and C6:0 in one group of cheeses and preferential release of C4:0 and C8:0 in another group. AS

885

Ladkani (BG) and Srinivasan (MR). **Changes in casein fractions in ripening of Emmental type cheese from buffalo milk.** *Indian Journal of Dairy Science* 43(2): 1990: 200-202

This study showed that α and β fractions of casein degraded during ripening of different samples of Emmental type cheese. The α casein degraded to the extent of 68.8 - 72.4, 51.1 - 56.5 and 51.2 - 57.56% in cow, buffalo and mixed cheeses resp. using culture type I. The corresponding values were 71.1 - 71.3, 60.0 - 60.1 and 50.98 - 65.9% in culture type II. However, β fraction degraded in the range of

34.65 - 42.1, 35.0 - 37.1 and 41.5 - 43.5% in cow, buffalo and mixed milk cheeses resp. using culture type I to correspond with the values being 32.3 - 40.0, 28.75 - 35.1 and 32.6 - 44.7% in culture type II. The casein fractions in cow and mixed milk cheeses revealed faster degradation than buffalo milk cheese. Cheeses made from H.T.S.T pasteurised milk containing culture type II showed rapid degradation. AS

Dahi

886

Jayanta Ghosh and Rajorhia (GS). **Technology for production of *Misti dahi* - a traditional fermented milk product.** *Indian Journal of Dairy Science* 43(2): 1990: 239-246

Misti dahi (syn. sweetened curd, *lal dahi, payodhi*) is a traditional fermented milk product of India, prepared from partially concentrated sweetened milk. *Misti dahi* is described as a thick gel of high consistency with cool, sweet and sour taste, pleasant aroma and brown colour. In view of the growing commercial significance, and existing method being suitable for small scale, the technology for commercial production of *Misti dahi* was standardised physicochemical and sensory properties of *Misti dahi* was as affected by various ingredients and processing conditions were investigated and recommendation for industrial production made. The most suitable process involved: evaporation of skim milk, standardisation of SNF (13%) and fat (5%), homogenization at 5.49 MPa pressure at 65 C, sweetening with cane sugar (14%) and heating of mix to 85 C for 10 min. The mix cooled to 30 C is inoculated with LF-40 culture (1%) and incubated at 30 C for 7 h to obtain a firm curd. AS

887

Rathi (SD), Deshmukh (DK), Ingle (UM) and Syed (HM). **Studies on the physicochemical properties of freeze-dried dahi.** *Indian Journal of Dairy Science* 43(2): 1990: 249-251

The method of standardization of preparation of freeze dried dahi and its effect on consumers acceptability and physicochemical properties are reported in this paper. BV

Ghee

888

Kohli (RK) and Sarma (SC). **Mechanisation in ghee.** *Indian Journal of Dairy Science* 43(2): 1990: 181-184

A significant savings in the thermal energy by using scrapped heat exchanger during ghee preparation was observed. The energy consumption is in the ratio of 1:4 approx. The heat consumption/kg of butter was max 187 Kcal/kg with scrapped heat exchanger. BV

889

Aneja (RP) and Murthi (TN). **Conjugated linoleic acid contents of Indian curds and ghee.** *Indian Journal of Dairy Science* 43(2): 1990: 231-238

Gulab jamun

890

Rajorhia (GS) and Dharam Pal. **Storage quality of gulab jamun mix powder as influenced by flexible packages.** *Indian Journal of Dairy Science* 42(2): 1989: 326-329

The storage studies of gulab jamun mix powder (GMP) prepared by dry blending of spray dried skim milk powder maida, soji, baking powder, cardamom and vanaspati were conducted in four types of packaging materials (Polyethylene, saran coated cellophane, laminates of paper/Al foil/LDPE and matalised polyester/LDPE) at storage temp. of 37 +/- 1 C and 30 +/- 1 C. The shelf life of GMP was more than six months at 30 C in all 4 packaging materials. Saran coated cellophane proved to be best packaging material followed by paper, Al foil/LDPE laminate. At 37 C, the shelf-life of GMP in paper/Al foil/LDPE laminate was 2 months and in saran coated cellophane about 3 months. Browning, increase in 5-HMF value, free fat content and flavour deterioration was noticed at elevated temp. The textural properties of Gulab jamun manufactured from the stored samples improved significantly. SRA

Khoa

891

Goyal (GK) and Srinivasan (MR). **Effect of packaging on the chemical quality of khoa during storage.** *Indian Journal of Dairy Science* 42(2): 1989: 165-170

Three types of khoa samples prepared in lab. from cow's milk, buffalo milk and purchased from market, packed in different flexible packaging materials and stored at 4-5 C and 100% RH for various time intervals were studied for chemical quality. Khoa samples packed in poster paper/aluminium (Al) foil/low density polyethylene (LDPE) (55/60 gsm, 0.02 mm and 150 guage) showed min chem. changes during storage and proved best followed by the samples packed in poster

paper/Al foil/LDPE (55/60 gsm, 0.009 mm and 150 guage), and MST cellulose film-DPE (30 G/M ^{2} and 150 guage) and tin cans in descending order. The four types of packages, the three types of khoa, and the intervals of storage period, each individually influenced the chem. quality of khoa. BV

892

Singh (SK) and Rajorhia (GS). **Adoption of roller drying process for khoa making.** *Indian Journal of Dairy Science* 42(2): 1989: 321-325

Investigation was made to study the feasibility of manufacturing khoa on a doble drum drier so that the dairy plants possessing roller drying facility could manufacture khoa on commercial scale. A standard method can be used for khoa making by roller drying process from standardised cow (fat 4% and SNF 8.5%) and buffalo milk (fat 5% and SNF 9.0%) after vaccum concn. to 50% RS, preheating to 74 C for 10 min and controlling milk flow rate, speed of roller, steam pressure and distance between knives, and roller drums. Khoa prepared by roller drier is compared to traditional khoa for their flavour, texture and chem. comp. Khoa showed a shelf-life of less than 5 days at 30 C and 15 days at refrigeration temp. Roller driers can successfully be employed for large scale production of khoa by combining a suitable kheading device. SRA

893

Jadhav (NS), Waghmare (PS) and Zanjad (PN). **Observations on the dehydration of heat induced milk foam for khoa making.** *Indian Journal of Dairy Science* 43(2): 1990: 185-189

The *Khoa* was prepared by dehydration of heat induced foam using the milk in the proportion of 1/2, 1/11, 1/10, 1/9, 1/7 and 1/6th to the capacity of *Karahi*. The product was also prepared by traditional method with same quantity of milk used in each treatment of foam dehydration method. The time required for the preparation of *khoa* was less upto 1/10th of foam treatments than corresponding treatments of conventional method. The *khoa* prepared from 1/12th and 1/11th treatments of above method was of excellent quality in respect to taste, colour and physical make up followed by 1/10th and 1/9th treatments, which were also liked very much and found superior over the treatments of conventional method. The chemical comp. of *khoa* prepared by both the methods was almost similar, indicating that all the constituents are evenly distributed in *khoa* prepared by foam dehydration method. AS

894

Rajorhia (GS), Dharam Pal, Garg (FC) and Patel (RS). **Effect of quality of milk on chemical, sensory and rheological properties of khoa.** *Indian Journal of Dairy Science* 43(2): 1990: 220-224

Khoa samples prepared from fresh and slightly sour milk (upto 0.20% acidity) had similar sensory and rheological property. Sour milk having more than 0.25% acidity resulted in acidic smell and large grain formation in khoa. Such samples showed max. hardness, springiness, gumminess and chewiness. Nutralization of sour milk with 20% sodium bicarbonate solution improved the flavour and smoothened the texture of khoa. AS

895

Punjrath (JS), Veeranjaneyulu (V), Mathunni (MI), Samal (SK) and Aneja (RP). **Inclined scraped surface heat exchanger for continuous khoa making.** *Indian Journal of Dairy Science* 43(2): 1990: 225-230

An equipment to manufacture khoa as a continuous process has been developed and tested. The equipment reaches steady state in 8 - 12 min and quality of khoa obtained from this equipment remained unchanged over the test periods ranging from 6 - 14 h. The equipment comprises a balance tank, a positive displacement pump and an inclined scrape surface heat exchanger of special desgin. The investigation indicates that high quality khoa to meet the different needs can be manufactured in the plant by controlling the various parameters such as total solids in the feed, temp. of feed, pH/acidity of the feed, rotor speed and inclination. Feed with total solid between 41 - 55 and feed temp. between 10 - 80 C and steam pressure between 1 - 2kg/sq. cm were investigated to get different quality of khoa. The equipment is stable, can be cleaned in-place, reduces dredgery and can give between 40 - 55 kgs of khoa/h starting with 40 - 45% solid concentrated milk. The product losses are negligible and equipment can manufacture khoa of very high quality. AS

Milk powders

896

Tnohy (JJ). **Some physical properties of milk powders.** *Irish Journal of Food Science and Technology* 13(2): 1989: 141-152

Paneer

897

Pruthi (TD) and Koul (JL). **Paneer from crossbred cow's milk.** *Indian Journal of Dairy Science* 42(2): 1989: 403-404

This study reports that the yield of paneer range from 145.2 g to 156.5 g for 3% and 4.5% fat milk resp. Paneer obtained from milk with less than 3.7% fat did not contain the requisite 50% fat on dry basis (not conforming to PFA specifications). Paneer obtained from milk testing 32.7% fat or more conform to the PFA standard. Crossbred cow's milk with lower solid non-fat content required 4.7% fat for obtaining paneer conforming PFA standards. BV

Sandesh

898

Sen (DC) and Rajorhia (GS). **Quality characteristics of sandesh marketed in Calcutta.** *Indian Journal of Dairy Science* 42(2): 1989: 241-245

Three var. of sandesh viz. soft grade (narampak), hard grade (karapak) and kachhagolla sold in Calcutta city showed wide variations in chem. comp., microbial quality and sensory properties. Chemical analysis showed of karapak contained low amount of moisture, high proportion of sucrose and free fat content as compared to narampak and kachhagolla. Presence of starch materials was max. 86.7% in kachhagolla, 63.3% in narampak, and 46.7% in karapak. Kachhagolla and narampak var. were heavily contaminated with microorganisms (staphylococci, spores, yeasts, moulds and coliforms). Sensory evaluation indicated that narampak was liked most followed by kachhagolla and karapak var. The retail price of different var. of sandesh were: karapak Rs. 65/kg, narampak Rs. 58/kg, and kachhagolla Rs. 39/kg. BV

Shrikhand

899

Sharma (DK) and Reuter (H). **Shrikhand from UF-retentate.** *Indian Journal of Dairy Science* 42(2): 1989: 401-402

A new method is presented for the manufacture of shrikhand on an industrial scale. The advantages of this process are higher yield of chakka per unit milk, easy automation and process control. BV

Wheys

900

Kumar (S) and Mathur (BN). **Incidence of LP-system of milk constituents during preservation of buffalo milk. Part II.Electrophoretic and gel chromatographic behaviour of whey protein.** *Indian Journal of Dairy Science* 42(2): 1989: 190-193

Milk proteins

901

Kumar (S) and Mathur (BN). **The nutritional quality of milk proteins.** *Indian Journal of Dairy Science* 42(2): 1989: 198-202

The milk samples were presented by activation of LP-system with 70% thiocyanate (SCN) and 30% of hydrogen peroxide and were stored at 30 C for 16 h. The assessment of nutritional quality of protein from raw buffalo milk showed that the protein efficiency ratio values, net protein utilization as well as available methionine and lysine remained unaffected in this preservation condition. It appeared that 30 p.p.m. level of hydrogen peroxide employed for activation of LP-system together with level of oxidative products of SCN are too low to effect milk proteins in a manner that could alter their nutritional value. SRA

Caseins

902

Kumar (S) and Mathur (BN). **Incidence of LP-system on milk constituents during preservation of buffalo milk. Part I.Ion exchange chromatographic and electrophoretic behaviour of casein.** *Indian Journal of Dairy Science* 42(2): 1989: 185-189

MEAT AND POULTRY

903

Boyle (DL), Sofos (JN) and Schmidt (GR). **Growth of *Listeria monocytogenes* inoculated in waste fluids collected from a slaughterhouse.** *Journal of Food Protection* 53(2): 1990: 102-104

Cells of *Listeria monocytogenes* Scott A were artifically inoculated (26-378 CFU/ml) in waste fluids collected from a lamb slaughtering operations, and their growth was determined at 8 and 35 C. Samples tested included residual fluid from carcass rinsing (after hide and offal removal); a mixture of waste fluids from the floor (collected during the entire slaughtering and washing process); and a standard floor drain sample (drawn from the floor drain 5 min after clean-up was complete). Growth of *L. monocytogenes* within 24 h of incubation of the various waste fluid was more rapid at 35 (1-4 logs) than at 8 C (0.5-2 logs). Average generation times of *L. monocytogenes* growth at 8 C were in the range of 12.3 to 35.1 h, depending on waste fluid, while at 35 C generation times were in the range of 1.1-6.4 h. Therefore, waste fluids in slaughterhouse facilities can support growth of *L. monocytogenes*, which may then be introduced on carcasses and

retail meat cuts. Thus, slaughterhouse temp. should be as low as possible and cleaning and sanitation should be frequent in order to minimize carcass and retail meat contamination with the pathogen. AS

904

Keshri (RC) and Sharma (N). **Relationship between live weight and ready-to-cook yield in meat type pigeons.** *Indian Journal of Meat Science and Technology* 1(1): 1988: 18-22

Relationship between liver wt. and ready-to-cook yield with coeff. of correlation, regression and prediction equation to find out the ready-to-cook yield from live wt. of Indian *gola* pigeons (*Columba livia domestica*) are reported. AS

Meat

905

Kwiatek (K), Wojton (B) and Stern (NJ). **Prevalence and distribution of *Campylobacter* spp. on poultry and selected red meat carcasses in Poland.** *Journal of Food Protection* 532(2): 1990: 127-130

906

Karkare (UD), Sherikar (AT), Khot (JV) and Jayarao (BM). **Meat speciation in commercial canned meats using species antisera to thermostable antigens of adrenal glands.** *Indian Journal of Meat Science and Technology* 1(2): 1988: 84-88

907

Singh (VP), Divya and Singh (SD). **Comparative study on extraction methods for the determination of lipids from muscles.** *Indian Journal of Meat Science and Technology* 1(2): 1988: 121-124

908

Padda (GS), Sharma (N) and Chatterjee (AK). **Meat eating and health concerns - review.** *Indian Journal of Meat Science and Technology* 1(1): 1988: 1-8

Review. 51 references. BV

909

Sharma (BV), Padda (GS), Keshri (RC) and Sharma (N). **Acceptability studies of different stuff binders in chevon samosas.** *Indian Journal of Meat Science and Technology* 1(1): 1988: 32-36

910

Deva (AK), Narayan (KG) and Sinha (AK). **Bacterial quality and processing of salami and trekker.** *Indian Journal of Meat Science and Technology* 1(1): 1988: 37-42

911

Singh (SP), Parmatna Singh, Rajendra Prakash and Sharma (BV). **Estimation of meat production in states and union territories of India.** *Agricultural Situation in India* 44(11): 1990: 925-930

Beef

912

Ravindranath (G), Varadarajulu (P) and Sreeramulu Reddy (K). **A study on certain quantitative and qualitative characteristics of products prepared from buffalo meat and pork.** *Indian Journal of Meat Science and Technology* 1(2): 1988: 67-78

913

Kesava Rao (V) and Kowale (VN). **Effect of processing and storage on lipid oxidation in buffalo meat.** *Indian Journal of Meat Science and Technology* 1(2): 1988: 145-153

914

Kowale (BN) and Murari Prasad. **Quality gelation from buffalo bones.** *Indian Journal of Meat Science and Technology* 1(1): 1988: 53-56

Beef patties

915

Anjaneyulu (ASR), Sharma (N) and Kondaiah (N). **Effect of buffalo fat, whole egg liquid and fillers on the quality of buffalo meat patties.** *Indian Food Packer* 44(5): 1990: 39-46

Effect of buffalo fat (BF) in the form of minced fat, melted fat, combination of melted fat with soy oil and soy oil alone at 15% level was evaluated for emulsion stability (ES), yield and sensory properties of buffalo meat patties. In another exp., patties prepared with soy oil 15%, BF 15%, whole egg liquid (WEL) 3%; BF 15% with potato (3%) and BF 15% with refined wheat flour (maida) 3% were evaluated. Patties prepared with soy oil followed yield and acceptability. Incorporation of BF showed significant mouth coating irrespective of the method of fat incorporation. Good quality patties of higher acceptability could be produced by incorporating BF with WEL and BF along with potato. Addition of BF with refined wheat flour (maida) gave higher yield but due to mouth coating the product acceptability was affected. Incorporation of WEL in BF formulations is desirable to achieve better binding.

texture and acceptability of the emulsion type of buffalo meat products. VKR

916

Anjaneyulu (ASR), Sharma (N) and Kondaiah (N). **Effect of salt and phosphate preblending on quality of buffalo meat during frozen storage and acceptability of patties.** *Indian Journal of Meat Science and Technology* 1(2); 1988; 135-144

Mutton

917

Mir Salahuddin, Kondaiah (N), Anjaneyulu (ASR) and Bisht (GS). **Quality of kababs from mutton and chicken.** *Indian Journal of Meat Science and Technology* 1(2); 1988; 99-104

Comparative quality of kababs from mutton (M), spent hen meat with byproducts (C) and combination of the two (1M/1C) was investigated with respect to physico-chemical, functional and sensory properties. Chicken formulations had higher pH and protein % but lower moisture % than mutton. Chicken kababs were characterised by higher cooking yield and ash % and lower moisture % than mutton kababs. 1M/1C formulation/kababs had intermediate values for all these parameters. Emulsion stability of chicken was superior than mutton but 1M/1C was comparatively poor. Chicken kababs were preferred. 1M/1C kababs were rated better than kababs from mutton. AS

Goat

918

Padda (GS) and Sharma (N). **Goat meat and meat products - A review.** *Indian Journal of Meat Science and Technology* 1(2); 1988; 58-66

Review. 53 references. BV

919

Pal (UK) and Bachhil (VN). **Effect of chemical sprays on quality and shelf life of fresh goat meat at ambient temperatures.** *Indian Journal of Meat Science and Technology* 1(2); 1988; 114-120

Five trails were conducted to study the effect of organic sprays on shelf life and quality of fresh goat meat stored at ambient temp. Two formulations of acetic, lactic, citric, ascorbic acids and potassium sorbate combinations were used. Samples treated with spray solutions were acceptable upto 24h of storage with mean total aerobic mesophilic counts of log 7.25 and log 7.36/cm^2. Untreated and treated meats having high organoleptic acceptability mean ERV of 46.9 - 56.4 ml and in spoiled meats ERV varied from 16.6 - 26 ml. The pH of fresh meat varied from 5.71 - 5.94 and in spoiled meat it varied from 5.83 - 6.41. Cooked treated samples had better overall acceptability upto 24h. Both the spray solutions increased the shelf life of meat kept well upto 24h in and environment having min. and max. temp. of 10 - 35 C and RH of 67 - 88%. AS

920

Padda (GS), Sharma (N) and Bisht (GS). **Effect of different level and combination of onion, garlic and ginger paste on organoleptic and physico-chemical properties of goat meat balls.** *Indian Journal of Meat Science and Technology* 1(2); 1988; 129-134

Flavour and overall acceptability scores of goat meat balls could be significantly (P less than 0.05) improved by incorporating 5 - 7.5% onion paste or 1 - 2% garlic or ginger paste or 5 - 7.5% levels of mixed green curry stuff (GCS) containing 6% onion + 2% garlic + 2% ginger paste. Organoleptic acceptability of goat meat balls was good, though significantly (P less than 0.05) lower at 10% onion paste, 3 - 4% garlic or ginger pastes and 10% level of mixed GCS. The addition of mixed GCS levels had non-significant (P greater than 0.05) effect on moisture, protein and fat content of raw and cooked meat balls. AS

921

Kondaiah (N) and Sharma (N). **Effect of salt and polyphosphate on the physicochemical characteristics of goat meat under different handling conditions.** *Indian Journal of Meat Science and Technology* 1(1); 1988; 28-31

A study was conducted to find the effect of salt (2%) and polyphosphate (tetrasodium pyro phosphate 0.5%) on the physicochemical characteristics of goat meat under different handling conditions hot meat (HM), chilled meat (CM), hot frozen chunks (HFC), chilled frozen chunk (CFC), hot frozen mince (HFM) and chilled frozen mince (CFM). Irrespective of their handling condition, addition of salt and phosphate significantly improved pH, water holding capacity, emulsifiying capacity, extractability of proteins and decreased cooking loss. Except the effect on water holding capacity, handling conditions did not show significant differences when salt and phosphate were added. It is desirable to add salt and polyphosphate to the hot meat and improve the quality of hot meat in order to realise the full benefits of hot bonning. AS

Pork

922
Padda (GS), Keshri (RC), Sharma (BD) and Sharma (N). **The effects of some extenders/binders on organoleptic and chemical properties of pork koftas.** *Indian Journal of Meat Science and Technology* 1(1): 1988: 9-13

Pigs

923
Tarrant (PV). **The effects of handling, transport, slaughter and chilling on meat quality and yield in pigs.A review.** *Irish Journal of Food Science and Technology* 13(2): 1989: 79-107

This review examines the several closely-linked events surrounding slaughter that affect meat quality and yield. Emphasis is placed on the recent literature and on the practical application of research findings. Covers colour, drip, and keeping quality of pork, on-farm handling and loading for transport, transport to slaughter, stunning, electrical stunning, on-line detection of PSE and meat chilling. 106 references. BV

Rabbit

924
Altaf Hussain, Keshri (RC) and Sharma (N). **Effect of binders on organoleptic and physicochemical properties of rabbit meat patties.** *Indian Journal of Meat Science and Technology* 1(2): 1988: 89-93

Addition of liquid egg albumin (3%) improved nutritive value and had least dimensional changes after broiling. Egg albumin contributed better flavour, juiceness, texture and overall acceptability in rabbit meat patties as compared to maida (3%) except the cooking yield. BV

Products

Meat

925
Igene (JO), Farouk (MM) and. **Preliminary studies on the traditional processing of Kilishi.** *Journal of the Science of Food and Agriculture* 50(1): 1990: 89-98

Kilishi is a sun-dried traditional African meat product whose origin is lost in antiquity, but there is a dearth of scientific information regarding its physical, chemical and nutritional attributes and method of processing. This paper reports results of preliminary work carried out to study ingredient formulation, drying characteristics, chemical comp., taste-panel evaluation and lipid stability at room temp. for 60 wks. Results of two 4- kg batches of kilishi formulated using beef showed that fresh slices (0.17 plus or minus 0.05 cm thick) gave a final product (0.31 plus or minus 0.05 cm thick) consisting of 46.3% beef and 53.4% non-meat ingredients. Proximate chemical comp. in the finished product (g kg^{-1} was 75 plus or minus 3.2 moisture, 50.2 plus or minus 19 protein, 178 plus or minus 2.5 fat and 96 plus or minus 1.1 ash. The production process involved two drying stages. In the first, with the product before infusion, the critical moisture content was 1.75 kg water kg^{-1} solid, and in the second, after infusion, the moisture content before drying was below the critical moisture content of the fresh meat. The formulated product was organoleptically superior to a commercial sample and was remarkably stable given an initial 2-thiobarbituric acid test number of 1.53 and of 2.01 after 60 wks of storage. AS

926
Bawa (AS), Orr (HL) and Usborne (WR). **Performance of extender and fillers in commercial preparation of Wieners.** *Indian Journal of Meat Science and Technology* 1(2): 1988: 94-98

927
Deva (AK), Sinha (AK), Choudhary (SP) and Narayanan (KG). **Surface spoilage of salami.** *Indian Journal of Meat Science and Technology* 1(2): 1988: 125-128

Microbial cause of surface spoilage of salami was elucidated. 16 different isolates of bacteria from spoiled salami and 2 from the air of chilled room of the meat processing plant were identified. These were innoculated on the surface of salami collected immediately after production, and incubated in laboratory at 7 C and in the chilled room of the plants. Reisolation and identifications of bacteria were done. *Aerococcus* sp. and *Staphylococcus* sp. grew on the surface of experimentally inoculated salami giving rise to surface spoilage resembling the one observed in the naturally spoiled salami. AS

928
Samooon (AH) and Sharma (N). **Studies on processing and preservation of Nate-Yakhni an indigenous meat product of Kashmir.** *Indian Journal of Meat Science and Technology* 1(1): 1988: 48-52

Processing procedure and recipes were standardised for Nate-Yakhni-a popular indigenous meat product of Kashmir. Nate-Yakhni was found to have high

nutritive contents, good cooking yields, appealing flavour and other palatability characteristics. Cooked Nate-Yakhni can be stored at 4 plus or minus 1 C for 7 days in LDPE bags without much change in its acceptability. AS

Hamburger

929

Vareltzis (K), Soultos (N), Zetou (F) and Tsiaras (I). **Proximate composition and quality of a hamburger type product made from minced beef and fish protein concentrate.** *Lebensmittel-Wissenschaft und - Technologie* 23(2): 1990: 112-116

Salami

930

Deva (AK) and Narayan (KG). ***Bacillus* sp. in salami and trekker.** *Indian Journal of Meat Science and Technology* 1(1): 1988: 14-17

Sausages

931

de Guzman (AMS), Micalizzi (B), Torres Pagano (CE) and Gimenez (DF). **Incidence of *Clostridium perfringens* in fresh sausages in Argentina.** *Journal of Food Protection* 53(2): 1990: 173-175

932

Ahvenainen (R), Kivikataja (R-L) and Skytta (E). **Factors affecting the shelf-life of gas- and vacuum-packed cooked meat products. Part II.Vienna susages.** *Lebensmittel-Wissenschaft und - Technologie* 23(2): 1990: 130-138

Poultry

933

Keshri (RC), Sharma (N) and Pal (UK). **Poultry chilling.** *Indian Journal of Meat Science and Technology* 1(2): 1988: 105-113

Aspects covered in this review include: immersion chilling, spray chilling, air chilling, evaporative chilling, cryogenic chilling of poultry meat. Effects of chilling on moisture gain, retention and loss during frozen storage, thawing and cooking have been covered. Microbial problems connected with different process are reported. Merits and demerits of the technique and cost consideration are discussed. BV

Chickens

934

Bawa (AS), Vineet Jindal and Thind (SS). **Effect of packaging and storage on the quality of chicken sausages containing soy flour.** *Indian Journal of Meat Science and Technology* 1(2): 1988: 79-83

Chicken sausages containing 0, 5, 10, 15, 20 and 25% levels of soy flour were packed in 200 and 400 guage polyethylene bags and stored at 5 plus or minus 1 C to study the effect of soy flour and packaging material on their quality. Packaging and storage did have a significant effect on sensory panel scores for the colour, texture, flavour and overall acceptability, however over all acceptability was significantly lower at the end of 2 wks of storage. Storage resulted in an increase in total plate count but the packaging did not have significant effect. Chicken sausages containing soy flour had a shelf life of 14 days at 5 plus or minus 1 C. Thickness of polyethylene did not have a significant effect on quality and shelf life of sausages. AS

Broilers

935

Izat (AL), Hierholzer (RE), Kopek (JN), Adams (MH), McGinnis (JP), Reiber (MA). **The use of propylene glycol and /or lactic acid in chilled water for reducing *Samonella* on broilers.** *Journal of Food Processing Preservation* 14(5): 1990: 369-374

A study was conducted to determine the effect of propylene glycol (PG) and lactic acid (LA) alone, or in combination, on levels of *Samonella* on broiler carcasses. Chicks were inoculated with salmonellae via the drinking water on days 2, 7, 14 and 21. At 49 days birds were processed and carcasses were subjected to chemical treatment in the chill water. Two treatments were effective in completely eliminating salmonellae from the carcass (0.25% LA + 20% PG or 0.50% LA + 20% PG). However, both levels of LA resulted in discolouration of skin, and all levels of PG that were evaluated (5, 10, or 20%) produced carcasses that exibited sickeningly sweet odour. Colour and odour problems didn't diminish with time. AS

Poultry products

Eggs

936

Panda (PC). **Keeping quality of chicken, turkey and duck egg melange following pasteurization.** *Indian Journal of Meat Science and Technology* 1(1): 1988: 43-47

The best time-temp. combination for pasteurizing egg melange obtained from chicken, turkey and duck was found to be 62 C for 3 - 5 min. in case of chicken and turkey and 65 C for 2 - 5 min. for duck: as it could bring down the bacterial load in it to less than 99% of its initial value following treatment. The said treatments assisted in maintaining the bacterial load within the limit of 20,000/gm at 5 plus or minus 1 C for 36 h in case of former two and 60 h in the later one. Organisms that survived the aforesaid pasteurization belonged to the genera *Alcaligenes*, *Aerobacter*, *Bacillus*, *Escherichia*, *Flavobacteria*, *Micrococci*, *Proteus*, *Sarcina* and *Serratia*. AS

Egg powder

937

Matic (S), Mihokovic (V), Katusin-Razem (B) and Razem (D). **The eradication of *Salmonella* in egg powder by gamma-irradiation.** *Journal of Food Protection* 53(2): 1990: 111-114

The contamination of whole egg powder with salmonellae was investigated in suspected samples. They were found to contain between 0.1 and 0.01 CFU/g of *S. lille*, *S. enteritidis*, and *S. typhimurium*. The radiation resistance of these strains was investigated in artifically inoculated whole egg powder. The decimal reduction dose (D_{10}) 0.8 kGy was obtained for a mixture of the three strains. A reduction factor of 10^3 can therefore be accomplished by irradiation with 2.4 kGy. While this may be adequate in many cases, higher reduction factors may also be desirable. They are obviously possible with a higher dose of radiation, or, alternatively, by following low-dose irradiation with post-irradiation storage. For example, irradiation with 1 kGy followed by 3 wks, storage is approx. equivalent to the immediate bactericidal effect of 3 kGy. AS

Sausages

938

Vineet Jindal and Bawa (AS). **Utilization of spent hens and soy flour in the preparation of poultry sausages.** *Indian Journal of Meat Science and Technology* 1(1): 1988: 23-27

The utilization of poultry meat from spent hen in products like sausages by replacing poultry meat with soy flour prepared from textured nuggets at 5, 10, 15, 20 and 25% levels were investigated. Moisture, fat, salt and nitrite content: total plate count and cooking loss decreased with increase in soy flour level whereas protein and ash content increased. The meat from spent hens can be blended with soy flour upto 10% level of replacement in the preparation of poultry sausages without any adverse effect on the consumer acceptability. AS

SEAFOODS

939

Nakayama (A), Fujii (T) and Nako (M). **Heat resistance of bacteria isolated from spoiled *Shotturu*.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 56(2): 1990: 361

Heat resistance of the causative bacteria belonging to the genus *Halobacterium* and *Streptococcus* responsible for the spoilage of *Shotturu* was studied. Six strains of bacteria isolated from spoiled *Shotturu* and *moroni* (semimanufactured goods of *Shotturu*) and 2 authentic strains of extremely halophilic bacteria were obtained from University of Tokyo. The cells of the strains were suspended in the NaCl BPG broth and also in *Shotturu* filtrate. These suspensions were further introduced into small tubes which were heat sealed and they were immersed in water bath at 50, 55, 60 C and 70 C for 10 min. The number of survivors were determined by the pourplate method. *Halococcus* and *Streptococcus* showed higher heat resistance. SBG

Lobster

940

Leblanc (RJ) and Leblanc (EL). **Effect of retort process time on the physical and sensory quality of canned lobster (*Homarus americanus*) meat.** *Journal of Food Processing Preservation* 14(5): 1990: 345-368

This study assessed samples of vacuum canned frozen controlled lobster meat and meat retorted 28, 35, 40 and 45 min resp. Moisture content, expressible moisture (EM) and shear force were determined on claw and tail samples from the various treatments. Concommitantly samples were evaluated by trained 8-member quantitative descriptive analysis (QDA) panel for odour, taste, sweeteness, saltiness, aftertaste, firmness, chewiness, stringiness, wateriness, springiness, juiceness, inner gray colour, inner pink colour and overall acceptance. Result show a decrease in moisture content, EM and shear force values with sterilization. In addition, longer operator processing times result in decrease in shear force values increased moisture content and increased EM for both claw and tail muscle. QDA result show increased development of gray colour and aftertaste with longer processing time that is congruent with decreased acceptability. These results may reflect

microstructural protein damage of the muscle structure and formation of Maillard browning products caused by the excessive cooking at high pressure, temp., moisture and salt concn. AS

Prawns

941

Matsumoto (M) and Yamanaka (H). **Changes in contents of glycolytic metabolites and free amino acid in the muscle of kuruma prawn during storage.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 56(9): 1990: 1515-1520

The concn. of glycogen and glycolytic intermediates during storage decreased and no significant accumulations in these substances was noticed. Six amino acids (tau, glu, pro, gly, ala and arg) accounted for 97% of the total free amino acids (FAA) in the kuruma prawn muscle. Gly alone accounted for 43%. The FAA decreased during the early storage and showed max. levels at the initial stage of decomposition regardless of storage temp. The changes in the total FAA was attributable to the contents of 5 major amino acids except for tau. Orn appeared to be useful as potential index for the freshness of kuruma prawn muscle. BV

Sea urchins

942

James (DB). **Sea urchin roe - a potential resource for export.** *Seafood Export Journal* 22(6): 1990: 29-36

Processing of sea urchins (Roe) in India and elsewhere and the limitation in processing, the edible portion in sea urchin and its quality, and commercial aspect of sea urchins especially its production in some countries of the world and its marketing have been dealt in this brief article. KAR

Fish

943

Baker (DA) and Genigeorgis (C). **Predicting the safe storage of fresh fish under modified atmospheres with respect to *Clostridium botulinum* toxigenesis by modeling lenth of the lag phase of growth.** *Journal of Food Protection* 53(2): 1990: 131-140, 153

The toxigensis of non-proteolytic *C. botulinum*, types B, E, and F, in a var. of fresh fish stored between 4 and 30 C for up to 60 days was evaluated in a 5 y study. Muscle homogenates and fillets were inoculated with 10^{4} - 10^{2} spores from multiple strain pools, then modified atm. (MA) packaged under vacuum, 100% carbon dioxide or 70% carbon dioxide and 30% N. Our conclusions are based on all data generated in 927 exp. comprising 18,700 samples. The earliest lag times (LT), i.e. sampling period prior to obervation of toxicity, among all exp. conducted at 30, 20, 16, 12, 8 and 4 C were 0.5, 1, 2, 3, 3 and 18 days, resp. The LT across exp. was significantly affected by temp. (p 0.00001), inoculum level (p), fish type (p 0.0001), spore pool (0.0001), and MA (p 0.02). The LT was not affected by homogenization of the fish muscle. We established a general formula that provides the most conservative model for the prediction of LT. This formula yielded calculated LTs that were very close to observed data and models based on individual exp. Temp. explained 74.6% of experimental variation in the final multiple linear regression model (r^{2} = 0.883). The spore inoculum level accounted for 7.4%, while other factors explained % together. The utility of the model is demonstrated by its ability to predict the time before toxigenesis in qualitative studies of *C. botulinum* toxicity in inoculated fish stored under different MA's, reported in the international literature. AS

944

Arul James (N). **Awareness and responsibilities of technologists in inprocess quality control system with fish processing industries.** *Seafood Export Journal* 22(6): 1990: 21-26

This is a general article giving guidelines for quality control in fish processing environment. Aspects like quality control to be practiced in raw material, processing plant, and in freezing and packing stages have been covered. Stress is laid on sanitation in the processing environment and personal hygiene. Quality control personnel should pay more attention to the inspection of the products which is a part of the quality control routines. KAR

945

Chand (BK), Dora (KC) and Maragal (MN). **Microwave heating and its prospect in fish processing in India.** *Seafood Export Journal* 23(1): 1991: 19-21

Briefly describes the mechanism and nature of microwave heating and scope for using microwave heating in fish processing. Various steps like tempering, and pasteurization have been covered. The use of packaging materials and cookwares, nutritional aspects of microwave cooked food and effect of microwave on human safety have also been described. The scope of microwave heating under Indian condition has also been included. SRA

946

Mahendrakar (NS), Khabade (VS), Yashoda (KP) and Dani (NP). **Chemical and microbiological changes during autolysis of fish and poultry viscera.** *Tropical Science* 31(1): 1991: 45-54

Fresh water fish viscera and poultry intestine were separately homogenised and treated with different combinations of sulphuric, formic, and propionic acid. The effectiveness of acid treament was assessed by pH changes. Autolysis in the acidified homogenates was followed by periodical changes in the N fraction viz., water-soluble N, Non-protein N and α-amino N contents; also microbial profiles during ensiling. The studies on the N fractions indicated that autolysis was complete in 7 days with fish visera as against 3-4 days for poultry intestine and that the rate of autolysis was governed by the pH of the homogenates and not the type of acid combination used. Acidification of offals to pH below 3.9 significantly reduced the total microbial count and completely eliminated the coliform. AS

Hakes

947

de Koning (AJ) and Mol (TH). **Rates of free fatty acid fermentation from phospholipids and neutral lipids in frozen cape hake (*Merluccius* spp.) mince at various temperatures.** *Journal of the Science of Food and Agriculture* 50(3): 1990: 391-398

Hake mince was stored in frozen condition at -5, -18, and -40 C. Samples were withdrawn periodically, and the lipids were extracted and anlaysed for free fatty acid and phosphorus (P) content. The free fatty acid contents were corrected for the presence of acidic phospholipids and converted into genuine free fatty acid contents. The results at - 5 and 18 C showed an initial rapid surge of free fatty acid formation with a concomitant decrease in P content, followed by a second phase of slower free fatty acid generation and loss of lipid-P. At -40 C only one phase of free fatty acid generation and loss of lipid-P was observed. The rates of the enzymic hydrolyses of then phospholipids and the neutral lipids were calculated at the three temp. An Arrhenius plot showed that the decrease in rate of free fatty acid formation with decreasing temp. was greater for the phospholipids than for the neutral lipids. In the rapid and more important phase, the two rates were identical at about -12 C while above this temp. the phospholipids hydrolysed faster and below it the neutral lipids. Activation energies for the enzymic hydrolyses were calculated. AS

Mackerels

948

Akande (GR), Knowles (NJ) and Taylor (KDA). **Rancidity and changes in fatty acid composition of salted dried and salted smoked mackerel cakes.** *Tropical Science* 31(1): 1991: 55-63

Oxidative rancidity in salted dried and salted smoked mackerel cakes packed in vacuum pouches (VP) and low-density polyethylene (LDPE) bags and stored at 29 plus or minus 1 C was assessed using peroxide values (PV), thiobarbituric acid (TBA) values, and sensory evaluation technique. PV, TBA and taste panel scores were highest in the first wk of storage and decreased thereafter, PVs ranging from 15 - 300 mEq oxygen/kg of lipid, and TBA values from 10 - 20 malonaldehyde (MA)/kg. Salted smoked cakes were generally found to have lower PV and TBA values than the corresponding salted dried cakes. Vacuum packaging resulted in the reduction of rancidity compared with the use of LDPE. Loss of polyunsaturated fatty acid from salted dried cakes were between 23% and 46% after the first wk of storage. The main losses include C20:5 (EPA), and C22:6 (DHA). AS

Puntius stigma

949

Ramamani (N) and Ramana Rao (JV). **Organoleptic assessment of freshness of preserved fish *Puntius stigma*.** *Andhra Agricultural Journal* 36(2-3): 1989: 138-140

An attempt has been made to distinguish between fresh and spoiled fish based on organoleptic evaluation involving scoring for texture and odour. Organoleptic scoring was done for eyes, gills, skin, odour and texture of *Puntius stigma* fish which has been preserved under refrigeration with and without salt as also under deep freezer. It was found that fresh fish obtained max. score and the score for odour decreased as the days went by compared to other characteristics. During spoilage the mean score was 3.5-4.0 in all the cases and almost all the characteristics changed in the spoiled fish. KAR

Salmon

950

Hayashi (T), Kohata (H), Watanabe (E) and Toyama (K). **Sensory study of flavour compounds in extracts of salted salmon eggs (Ikura).** *Journal of the Science of Food and Agriculture* 50(3): 1990: 343-356

Water soluble extracts were prepared from ikura and each component was analysed. Upon reconstruction of a synthetic ikura extract with pure reagents on the basis of the analytical data, flavour

components were sensorily examined by an omission test. This revealed that only 12 components played an important role in producing the characteristics taste of ikura. The novelty of some nucleosides as taste factors is also discussed. AS

PROTEIN FOODS

Infant foods

951

Earnshaw (RG), Banks (JG), Francotte (C) and Defrise (D). **Inhibition of *Salmonella typhimurium* and *Escherichia coli* in an infant milk formula by an activated lactoperoxidase system.** *Journal of Food Protection* 53(2): 1990: 170-172

A glucose/glucose oxidase activated lactoperoxidase system (LP-S) delayed the onset of exponential growth of *Salmonella typhimurium* and *Escherichia coli* in infant formula milk. Addition of urea peroxide with the LP-S reduced the initial population size and prevented growth of *S. typhimurium* and extended the lag period before the onset of exponential growth of *E. coli*. AS

952

Thompkinson (DK) and Mathur (BN). **Effect of buttermilk solids and methyl siloxane on the oxidative stability of lipids in a PUFA-rich, infant formula.** *Indian Journal of Dairy Science* 42(2): 1989: 391-393

Various parameters used to assess the oxidative stability of PUFA rich infant formulations during storage indicated that though there was gradual increase in the extent of chemical changes of the product, the magnitude of the total change was too low to be objectionable. Addition of buttermilk was not found to be much beneficial in controlling the rate of oxidation, but addition of methyl siloxane was found to have beneficial effect on lipid phase of the formulations in suppressing the rate of antioxidation. The chemical changes in the product containing methyl siloxane were lowest followed by the sample containing buttermilk as against control. SRA

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Wines

953

Ilcheva (L), Yanakiev (R), Vasileva (V) and Ibekwe (N). **Multicomponent flow injection analysis.Determination of potassium and calcium in wine.** *Food Chemistry* 38(2): 1990: 105-112

A flow injection potentiometric method for simultaneous detn. of K and Ca is suggested. The optimized double-channel flow system, in relation to component, speed of carrier solution, vol. of the sample and length of the mixing tube is characterized with high productivity (30-60 samples per h) and simple technical equipment. The method is applied for analysis of wine. In this case, reproducibility of results is lower than 2% while the accuracy, as compared with other methods, is not more than 5%. No preliminary treatment of the wine sample is required. AS

954

Joshi (VK), Bhutani (VP) and Sharma (R). **A method for preparation of wild apricot (chulli) wine.** *Indian Food Packer* 44(5): 1990: 50-55

Wine was prepared from undiluted and diluted (1:1 and 1:2) pulps of wild apricot. The must with 1:2 dilution containing 0.1% di-ammonium hydrogen phosphate (DAHP) increased the rate of fermentation. The wine from undiluted pulps were dark brown while the diluted pulp gave yellow with red tinge. The mineral comp. of the wine was in the desirable range. Wines from 1:2 dilution recorded higher score due to the taste, colour and flavour. Sweet wine was preferred over the dry wine. Flow sheet of the process and the chem. comp. of the wine are given. VKR

955

Joshi (VK), Attri (BL), Gupta (JK) and Chopra (SK). **Comparative fermentation behaviour, physico-chemical characteristics qualities of various fruit-honey wines.** *Indian Journal of Horticulture* 47(1): 1990: 49-54

Juices/pulp from apple, plum and pear were used to prepare wine by blending at 8:5:3 ratio of pulps/juice, water and honey. Fermentations were continued till the total soluble solids (TSS) content for the must got stabilised. The wines were matured for a yr before assessing the quality. TSS was highest in honey must and lowest in pear juice. Fermentation rate was highest in apple honey and least in honey while the plum and pear must had intermediate value. Except in apple which recorded the highest amount of residual sugar, in all others the entire sugar was fermented. Alcohol content was highest in apple honey and least in plum honey

and intermediate in honey and pear honey. The volatile acidity was in the range of 300-400 mg/l in the four treatments; inclusion of fruit juice/plup decreased the aldehyde content but increased the ester content as compared to honey alone. Sensory evaluation of the wines showed apple honey wine to be the best; plum honey was not acceptable due to poor TSS-acid ratio. In bitterness pear honey wine scored the highest although the differences among the treatment were very small. KAR

Non-alcoholic beverages

Coffee

956

Rangaswamy (JR). **Differential responses of Robusta and Arabica coffee beans to phosphine fumigation.** *Indian Coffee* 54(8); 1990; 11-13

Fumigation of 2 kg each of Robusta and Arabica in 6 replicates at a dose of 3 celphos tablets/t followed by areation and desorption were done. Free phosphine residue in pre- and one-day aired samples of Robusta and Arabica were determined. Inorganic phosphorus in controlled and fumigated samples was also determined. Robusta holds higher initial free phosphine residue than Arabica. Large amount of phosphine is desorbed for Robusta during first 8 h, while similar desorption was noticed from Arabica during first 24 h. Both pre-aired and one-day aired samples of Robusta hold higher computed residue than the corresponding samples of Arabica. Oxidation of phosphine is more in Robusta than in Arabica. After 29 days, Robusta and Arabic were devoid of free and computed residues of phosphine. GSR

957

Gopalakrishnan (N). **Carbon dioxide extraction of coffee beans.** *Indian Coffee* 54(9); 1990; 7-9

A brief review covering the use of carbon dioxide for the decaffeination of coffee beans. The advantages of the process and the developments taken place in this process are described. A modified process where activated carbon is used as adsorbent to avoid water distillation procedure has also been indicated. 29 references. KAR

Fruit juices

958

Ramteke (RS), Eipeson (WE) and Patwardhan (MV). **Behaviour of aroma volatiles during the evaporative concentration of some tropical fruit juices and pulps.** *Journal of the Science of Food and Agriculture* 50(3); 1990; 399-405

The dynamics of aroma separation from some tropical fruit juices and pulps was studied using a thin flim evaporator. In the case of mango (*Mangifera indica* Linn, Alphonso and Totapuri var.) and guava (*Psidium guajava*) Linn) pulps, 90% of each of the volatile fraction, esters, carbonyls and alcohols, was removed at 30-35% evaporation of the water in a single pass. In the case of pineapple (*Annas sativa* Schult F) juice, 90% separation of esters and carbonyls required about 80% and 47% evaporation, resp. However, the behaviour of alcohols in pineapple juice was found to be similar to that of mango and guava. Mango pulp from Alphonso and Totapuri var. on 60% evaporation showed a loss in oxygenated terpenes of 80% and 63% resp., while guava pulp loss about 58% oxygenated terpenes on 60% concn. The dynamics of the total aroma volatiles separation from the fruit juices and pulps showed that, in single pass evaporation, 85-90% volatiles were removed at a juice evaporation degree of 60% water, while the same extent of aroma removal occurred at 32-35% total evaporation by multiple pass. AS

959

Kalra (SK), Tandon (DK) and Singh (BP). **Evaluation of mango - papaya blended beverage.** *Indian Food Packer* 45(1); 1991; 33-36

Blending of fruit drinks could be an economic requisite and also needed to improve the appearance, nutrition and flavour. Mango cv. ('Totapuri', 'Banganpalli', 'Sashehari', 'Chausa') and papaya pulps were blended in 1:0; 1:1, 2:1, 3:1 and 0:1 ratio and stored for 1 yr. Beverages prepared at 0, 4, 8 and 12 months from the stored pulp containing 15% pulp, 20% T.S.S. and 0.3% acidity, preserved for 1 yr. in glass bottles under ambient conditions (20 - 36 C). Titrable acidity and T.S.S. did not change significantly during storage. The papaya beverage (15% pulp) contained double the contents of vitamin C (8 mg %) as compared to pure mango beverage and its 80% of vitamin C was retained after 1 yr. storage. The yellowness indices of mango was higher than papaya. The study indicated that 25-33% papaya pulp could be incorporated in mango without affecting the quality and acceptability of the mango beverage. It is concluded that papaya which is cheaper could be blended with 'Dashehari', 'Chausa' or other var. in the preparation of pulp and juices. VKR

960

Khurdiya (DS). **A study on fruit juice based carbonated drink.** *Indian Food Packer* 44(6); 1990; 45-50

The feasibility of preparing fruit based carbonated drink from lime, phalsa, jamun, ber, and apple were tried. The juices were converted into drinks of different Brix-acid ratio, chilled and carbonated at 40-120 psi of carbon dioxide and analysed T. S. S., acidity, pH and ascorbic acid. The carbonated drink made from lime having 50 Brix-acid ratio at 100 psi carbon dioxide; Jamun 28.57 Brix-acid ratio at 80 psi carbon dioxide; phalsa 25 Brix-acid ratio at 80 psi carbon dioxide; ber 45 Brix-acid ratio with 33.3% dried ber juice at 120 psi carbon dioxide; apple 41.4 Brix-acid ratio with 36 ml concn. at 100 psi carbon dioxide were found to be the best. VKR

Kinnow mandarin juice

961

Sandhu (KS), Bhattia (BS) and Shukla (FC). **Effect of lye-treatment on the quality of Kinnow mandarin juice.** *Indian Journal of Horticulture* 47(1); 1990; 55-59

Peeled fruit of Kinnow mandarin were lye-treated in soaking 1% HCl acid for 1h followed by dipping in sodium hydroxide solution for 30 seconds at 82-83 C. The juice extracted were pasteurised and filled in glass bottles. Mandarin juice concn. of 42 Brix was also prepared under vacuum and filled in glass bottles. Both the juice and conc. were stored at 10 - 38 C (ambient temp.) for 8 months. Juice recovery was 48.23% in lye-treated and 52.41% in untreated samples. Except an increase in pH, other components like total solids, total soluble solids, acidity, sugar, pectin, flavonone, ascorbic acid and carotenoids decreased to varying extent by lye-treatment. Decreases in titratable acidity, pectin, ascorbic acid, carotenoid, flavonones and sulphur dioxide contents were observed with advancement with storage in lye-treated juice and conc. Loss of pectin was less in conc. than in juice. Ascorbic acid retention in the conc. was intermediate between the treated and untreated juice. The treated conc. had more retention of carotenoids than untreated while the juice from treated and untreated segments had equal stability of carotenoids. No change was observed in the total soluble solids, total sugars, and pH of any of the stored samples. The sensory quality of lye-treated juice and conc., assessed from the appearance and flavour of ready-to-serve drinks was better than the untreated ones. Gelation was observed in the untreated conc. after 3 months storage resulting in loss of reconstitutability. It is concluded that lye treatment although decreased the juice recovery, yet improved the organoleptic and keeping quality of the product. KAR

Orange juices

962

Lopez (F) and Izquierdo (L). **Unsuitability of data acquired from blended samples for testing orange juice purity.** *Journal of the Science of Food and Agriculture* 50(1); 1990; 119-125

Non-blended juices (83) obtained directly from Spanish oranges and several computer-simulated blends of these juices were used as reference samples for the detection of orange juice dilution. Amino acids (16), absorbances at different wavelength (3), minerals, (3), ash and isocitric acid were determined in each non-blended juice. The values of these characteristics in blended samples were calculated from the proportions of juices used in simulating each blend. When using non-blended juices for references, no significant erroneous rejection (less than 1% working at the 99% confidence level) of pure juices and quite good detection of diluted samples were observed. By contrast, the use of reference sets of blended samples led to the erroneous rejection of many pure juices (74% of non-blended juices when the reference set was constituted by binary blends). AS

Tea

963

Joubert (E) and Hansmann (CF). **Effect of time on fixed-bed extraction of soluble solids from Rooibos tea (*Aspalathus linearis*).** *Lebensmittel-Wissenschaft und - Technologie* 23(2); 1990; 178-180

The extraction rate of soluble solids from Rooibos tea, using a fixed-bed system, was investigated. Extraction was carried out at 90 C at flow rates of 0.09 and 0.18 m^3 h. Empirical equations were established to describe the change in extract concn. with time. Integration of these equations, with due allowance for non-linear flow, allowed prediction of the change of bulk extract concn. and yield with time. The calculated values correlated well with the experimental values. Yields of 15.93 and 13.83% were obtained for flow rates 0.09 and 0.18 m^3h, resp. AS

964

Sud (RG) and Bhattacharjee (BK). **Quality evaluation of tea (*Camellia sinensis*) of Kangra valley.** *Indian Journal of Agricultural Sciences* 60(10); 1990; 660-664

The quality of the tea of Kangra valley has been assessed during 1988 on the basis of polyphenolic oxidation products in black tea liquors, mineral comp. of made tea and taster's evaluation. The sample used was tea made on weekly intervals at the Palampur Co-operative Tea Factory. The time

duration for withering, rolling and fermentation was regulated according to weather conditions, green leaf quality, temp., and humidity existing at the time of manufacture during different seasons. Thearubigins, theaflavins, colour, brightness and mineral constituents were estimated. Results indicated that the April produce was of superior quality because it had higher colour, brightness and thearubigins, theaflavins ratio of 10.5-12.11 followed by the May, June and October product. The winter tea was of better quality than the rainy season tea. GSR

Black tea

965

Owuor (PO), Obaga (SO) and Othieno (CO). **The effects of altitude on the chemical composition of black tea.** *Journal of the Science of Food and Agriculture* 50(1); 1990; 9-17

Changes in quality parameters of crush, tear and curl (CTC) black clonal teas due to variations in altitude within a radius of 10 km were determined. There were significant ($P = 0.05$) changes in all the quality parameters due to areas of production despite the short sampling radius. The Group I volatile flavour compounds (VFC) increased with decrease in altitude whereas Group II VFC and flavour index (FI), theaflavins (TF), thearubigins (TR) (except in clone TN 14-3) and caffeine increased with increase in altitude. The tasters' evaluation also increased with increase in altitude. AS

Non-alocholic beverages

966

Joubert (E). **Effect of time on fixed-bed extraction of polyphenols from Rooibos tea (*Aspalathus linearis*).** *Lebensmittel-Wissenschaft und - Technologie* 23(2); 1990; 181-183

Extraction of total polyphenols, flavonoids and non-flavonoid phenols of Rooibos tea were investigated with a fixed-bed system at an extraction temp. of 90 C and flow rates of 0.09 and 0.18 m^3h. Extraction conditions affected phenolic content of extracts, soluble solids and yield of polyphenols. Increasing flow rate resulted in decreasing extraction of polyphenols at set extraction times. The total polyphenols and flavonoid content of soluble solids increased for the first 5 to 8 min of extraction, while non-flavonoid phenols remained constant (12%). Total polyphenols consisted mostly of flavonoids (59-68%) depending on extraction time. AS

Oils

967

Leela (P). **Edible oil crisis and edible oil imports of India.** *Agricultural Situation in India* 44(11); 1990; 909-913

FATS AND OILS

968

Anon. **Application of gas-liquid chromatography to the analysis of essential oils. Part XV.Determination of "Rhodinol" in oils of Geranium.** *Analyst (London)* 115(4); 1990; 459-463

The "Rhodinol" contents of oils of geranium were determined by gas-liquid chromatography. Amount of individual free alcohol, like citronellol, geraniol and linalol can be calculated by GLC. A preliminary trial was arranged in which different lab. were asked to determine the individual alcohols in a sample of oil of geranium. Results from five lab. have been compiled and documented in the paper. OV 101 column was used for GLC analysis. Methods have been given to calculate free and total Rhodinol content in a sample. N.

969

Handoo (SK), Sanjoy Gupta, Deoli (SP) and Agarwal (TL). **Hydrogenation of rapeseed oils without pre-deodourization.** *Research and Industry, India* 35(3); 1990; 167-169

Degummed, alkaline refined and bleached rapeseed oil was hydrogenated using 0.15% nickel catalyst at 182 - 200 C and 20 psig hydrogen pressure without pre-deodourizing the bleached oil. The studies revealed that the hydrogenation was effective only when the nickel catalyst was charged into the autoclave in two steps. The first step hydrogenation with 0.1% catalyst for 3 h and second step hydrogenation with 0.05% catalyst for 1 h. This could hydrogenate the oil successfully. Further allylisothiocyanate which hinders the hydrogenation process could be removed appreciably by degumming the crude oil for longer duration. AS

Groundnut oils

970

Hammonds (TW), Harris (RV) and Head (SW). **The effect of water on the extraction of oil from groundnut paste using a plate press.** *Tropical Science* 31(1); 1991; 65-72

In traditional oil extraction procedures, the addition of water to the oilseed feed stock provides and effective way to maximise the oil extraction efficiency at the low pressure use. For groundnut paste pressed in a plate press, the extraction efficiency increases upto an optimum moisture content of about 10 - 12%, above which oil yield diminishes. Using a pressure of 1 kg/cm ^{2}, and extraction efficiency of 46% can be obtained at moisture content of 12% in comparison with 8% at moisture content of 6.3%. Moderate heating of the oilseed to about 60 C results in an improvement in oil yield from 46% to 58% at 1 kg/cm ^{2} pressure and from 73% - 77% at 8 kg/cm ^{2} pressure. AS

SPICES AND CONDIMENTS

971

Pouget (MP), Pourrat (A) and Pourrat (H). **Recovery of flavour enhancer from vanilla pod residues by fermentation.** *Lebensmittel-Wissenschaft und - Technologie* 23(1): 1990: 1-3

Vanilla residues contain precursors which could be converted into vanillin by suitable enzymes. Given the high cost of natural vanilla flavouring, the recovery of flavouring agents from its residues would clearly be of economic interest. Accordingly, a study of the fermentation of vanilla pod residues has been done. Fermentation of vanilla residues yields products with userful aromatic properties. They enhance the flavour of vanilla extract and bring it closer to that of the freshly extracted flavouring. They have good stability. The fermentation process is reproducible on the lab. scale. AS

Spices

Cardamom

972

Shankaracharya (NB), Raghavan (B), Abraham (KO) and Shankaranarayan (ML). **Large cardamom - chemistry, technology and uses.** *Indian Spices* 27(3): 1990: 12-20

An exhustive review of the large cardamom (*Amomum subsaltum* Roxb.) covering production, export, cultivation, harvesting, varieties, curing methods and its influence on quality; grading and standards; physical and chemical comp.; uses; and constituents of volatile oils. 26 references. GSR

Cloves

973

Gopalakrishina (N), Shanti (PPV) and Narayanan (CS). **Composition of clove (*Syzygium aromaticum*) bud oil extracted using carbon dioxide.** *Journal of the Science of Food and Agriculture* 50(1): 1990: 111-117

Analysis of clove (*Syzygium aromaticum* L) bud oil extracted with liquid and supercritical carbon dioxide shows significant qualitative and quantitative compositional differences compared with oil obtained by the conventional hydrodistillation process. The parameters of pressure, temp., contact time etc. and also the clove oil components, affect the extraction of the bud flavour from the spice. AS

Coriander

974

Sanjeev Agrawal, Sharma (RK) and Bhatt (BN). **Quality evaluation in coriander.** *Indian Cocoa, Arecanut* 13(4): 1990: 137-138

Seeds of 15 var. of coriander were analysed for soluble sugar, protein and essential oil contents. The total soluble protein ranged from 10 to 15% with a max. of 15% in var. 'CS-6' and 14.5% in 'CO-1'. The total soluble sugar ranged from 2.2 to 6.25%. The essential oil content was 0.10 to 0.40%, highest (0.40%) was in 'CS-2' followed by 'CS-7' (0.30%). Essential oil content is negatively correlated with soluble sugar content. It is concluded that high yielding var. have poor quality. GSR

Ginger

975

Gopalan (A) and Manandhar (D). **A process for the extraction of ginger oleoresin with optimum quality.** *Research and Industry* 36(1): 1991: 5-8

Counter current percolation method for extraction of oleoresin with sequential soxlet and overnight (lab) percolation methods were conducted for optimum yield. The % extractive yield was 6.04 with counter current, 5.71 with sequential, 6.84 with soxlet and 6.31 with cold solvent percolation. Three solvent combinations acetone, alcohol+acetone and alcohol in equal proportions were tried for oleoresin extraction. Solvent spice ratio is min. in counter current extraction and max. in overnight (lab) percolation method. Chem. comp. and quality of essential oil obtained by counter current extraction method using alcohol is superior to other solvent combinations. KAR

Pepper

976

Nirmala Menon (A), Thomas (PP) and Bhat (AV). **A study on shelf life of packed white pepper powder.** *Indian Spices* 27(4): 1990: 30-31

White pepper powder obtained by dry grinding of black pepper and passing through 300 micron sieve was stored for 6 months. Two samples having an initial moisture content of 10% and 14% were used. Packing materials like (i) cellophane paper pouch (10 cm x 10 cm) with white pepper powder placed in a polythene pouch (ii) PVC bottle with diam. of 6 cm and 12 cm height (iii) plain glass bottles with 250 ml vol. and diam. of 8 cm (iv) friction top tins of 500 g capacity and (v) plain cans with 6 cm. diam. and 6 cm height. Samples stored in cans were best as they showed min. loss of moisture, volatiles and also maintained colour, appearence and flavour. Oil loss during storage was higher with PVC and cellophane-polyethylene packages. GSR

977

Sowbhagya (HB), Sampathu (SR), Krishnamurthy (N) and Shankaranarayana (ML). **Stability of piperine in different solvents and its spectrophotometric estimation.** *Indian Spices* 27(1): 1990: 21-23

Spectrophotometry is the most common method used for estimating piperine in pepper products. But the solvents like benzene and ethylene dichloride used in this are carcinogenic. The extent of stability of piperine against light in other solvents like ethanol, acetone, ethyl acetate, chloroform and cyclohexane was determined. Protecting the dilute solution of samples along with solvents from light did not under go any loss of piperine upto 2 h. But considerable loss of piperine was observed when they were exposed to diffused day light. It is concluded that other solvents could be used in place of benzene and ethylene dichloride for piperine estimation provided they are protected from day light atleast for 2 h. KAR

SENSORY EVALUATION

978

Molnar (P). **Adaptation of collaborative methodology to the sensory evaluation of foods by scoring.** *Acta Alimentaria* 18(3): 1989: 269-282

Random error appearing in the course of food analysis can be determined by collaborative tests. In the collaborative test latent paired samples are investigated by the same method under similar circumstance and conditions by several lab. The results of the investigation tested by different statistical techniques are interpreted by two-way analysis of variance. This interpretation permits obtained within lab.: repeatability (r), and the permissible deviation of the analytical results between lab: reproducibility (R). Collaborative sensory evaluation is a specific case of collaborative study. Lab. are replaced by sensory panels. The weighting factor method of sensory evaluation by scoring each groups of attributes of a 5 point scale with a total of 20 points proved suitable for collaborative study. Data obtained in the collobrative test permitted of drawing conclusions as to the suitability of the sensory panels and the level and unambiguity of interpretation of the specification. By interpreting the experiences of the collaborative studies and by the summing up of the findings the evaluation method was revised and made more precise and the pertinent methodological standard was updated. The r and R values obtained in the sensory evaluation by scoring of soft drinks can be utilized in quality control. AS

FOOD STORAGE

979

Asaf Ali (K) and Balasubramanian (M). **A new tool to determine resistance to stored grains to weevils.** *Madras Agricultural Journal* 72(4): 1989: 239-240

A new 'Free choice' test kit has been designed and fabricated, to study the resistance offered by stored grains to weevil attack. The test kit made with a high grade transparent plastic (23 x 33 x 3 cm) consists of a lower chamber and tight fitting upper lid with four foot rest and plastic handle. It contains 18 small and 1 big sized wells, the smaller wells are filled with grains of 6 accessions replicated thrice. One hundred rice weevils (*Sitophilus oryzae* (L.)) is placed in the central well and allowed freely to select the var. of their non-choice. The differential susceptibility - resistance of sorghum accessions to rice weevil was studied with reference to progeny production development peroid in relation to their related index of susceptibility. By this it is possible to know which are resistant, moderately resistant and susceptible or highly susceptible. The test kit will be highly useful for screening large number of samples even with small quantities (25g) of grains. GSR

INFESTATION CONTROL AND PESTICIDES

980

Chang (M-C) and Morris (WC). **The effect of heat treatments on dietary fiber as assessed by scanning electron microscopy.** *Journal of Food Processing Preservation* 14(5): 1990: 335-343

Samples of apple fiber, corn fiber, oat bran, and soy fiber were heat processed in the autoclave and by microwave heat to determine the processing effect on the physical structure of the fiber. Scanning electron microscopy was used to evaluate these processing effects. Results showed the two processing methods yielded fiber that had a much greater surface area, as reflected by increased furrowing and cracking on the surface of the heat treated fiber. The increased surface area exposed to enzyme and microorganisms may influence the physiological role of these fiber in animals. AS

BIOCHEMISTRY AND NUTRITION

981

Jaeggi (NE), Bruynner (R) and Schmidt-Lorenz (W). **DEFT-technique in the analysis of foods. I.Pretreatment and enzymatic digestion.** *Acta Alimentaria* 18(1): 1989: 71-77

For the analysis of foods by the direct epifluorescent filter technique (DEFT) a var. of homogenised foods was rendered filterable by sedimentation, centrifugation and prefiltration through nylon mesh filters. Centrifugation of food suspensions resulted in good clarification but poor microorganisms recovery. A combined sedimentation and prefiltration process yielded good clarification and also good microorganisms-recovery. The elimination of food debris was further enhanced by adding enzymes and the surfactant Triton. Protease readily degraded cream, yoghurt, minced meat and frozen fish, whereas the application of analyses was only partially successfull in degrading precooked pasta, frozen peas, patisserie and ground pepper. AS

982

Camire (ME), Camire (A) and Krumhar (K). **Chemical and nutritional changes in foods during extrusion.** *CRC Critical Reviews in Food Science and Nutrition* 29(1): 1990: 35-57

This review summarises and presents recent developments in the understanding of chem. changes of starch (gelatinization: amorphous and crystalline starch: moisture effects, kinetics of gelatinization, influence of other compounds on gelatinization of lipids protein and other compounds, starch expansion and starch degradation) lipids (oxidative rancidity, antioxidants, nutritional values, physical effects, changes in at recovery and oil extraction), proteins (Maillard reaction: cross-linkages, nutritious protein blends, protein digestibility, protein solubility, texturization), minerals (valence changes, absorption, mineral binding and screw wear), dietary fibers (comp. changes, phytates, physical effects, power consumption and enzyme inactivation), vitamins (fat-soluble vitamins and water-soluble vitamins), and undesirable constituents of foods (microbes, aflatoxins, trypsin-inhibitors, glycoalkaloids, gossypol and allergens) 176 references. BV

983

Srivastava (GP). **Leaf protein.A futute food source for human nutrition.** *Indian Farming* 40(8): 1990: 20-23

Briefly covers choice of green vegetation leaf protein extraction technology, nutritive value and food preparations with leaf protein. BV

Nutrition

984

Lata Rawtani and Mira Varma. **A study of nutritional status and food practices of the pregnant and lactating women residing in selected desert areas of Jodhpur (Shergarh block).** *Indian Journal of Nutrition and Dietetics* 26(10): 1989: 304-310

This is a survey report of the dietary practices, food consumption pattern and nutritional status of desert population. It was observed that poverty, lack of food availability, climate, water scarcity and continuous drought played a major role in the nutritional status of women. The diet is mainly cereal based with the small addition of milk, pulses, roots, tubers and other vegetables. Green leafy vegetables, fruits, egg and meat are totally absent in the diet. The food of pregnant and lactating mothers lacked energy, calcium, carotene, niacin and ascorbic acid. However, intake of protein, iron and thiamine is above the recommended allowance. GSR

985

Usha (K) and Janabai Giri. **Evaluation of noon meal-through biochemical parameters.** *Indian Journal of Nutrition and Dietetics* 26(7): 1989: 183-190

This study reports the analyses of food served at different noon meal centres in Tamil Nadu and the impact of the noon meal programme on the nutritional status of the selected children. Five elementary schools and four child welfare centres were selected at random from both urban and rural areas in and around Coimbatore city (India). Food samples (100 g) were collected from these centres and analysed for various nutrients, heights and wt., blood haemoglobin level, urinary creatinine, thiamine and riboflavin levels. The increment in height and wt. and blood haemoglobin over a period of 6 months of childern participation in the programme, when compared to control groups was found to be significant at 1% level. Analysis of 24 hr urine for creatinine, thiamine and riboflavin indicated that creatinine excretion increases with age. Mean creatinine height index for the age groups 2 to 5 and 6 to 8 showed that the children belong to acceptable catering of protein status. GSR

TOXICOLOGY

Microorganisms

Bacteria

Clostridium perfringens

986

Saito (). **Production of enterotoxin by *Clostridium perfringens* derived from humans, animals, foods, and the natural environment in Japan.** *Journal of Food Protection* 53(2); 1990; 115-118

FOOD LAWS AND REGULATIONS

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